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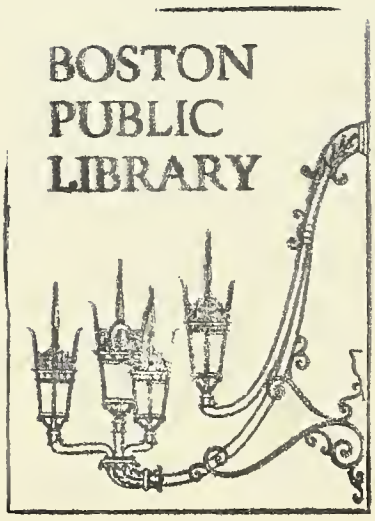
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REPORT TO THE METROPOLITAN DISTRICT COMMISSION ON COMBINED SEWER OVERFLOWS IN THE DORCHESTER BAY AREA

VOLUME I - ENGINEERING REPORT

June 9, 1980

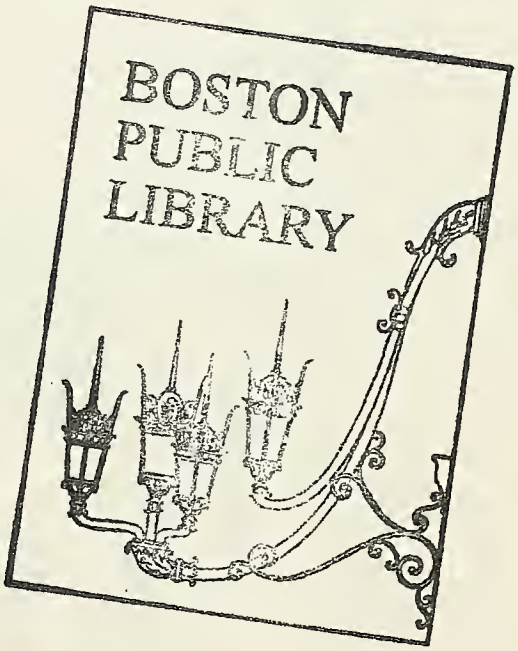

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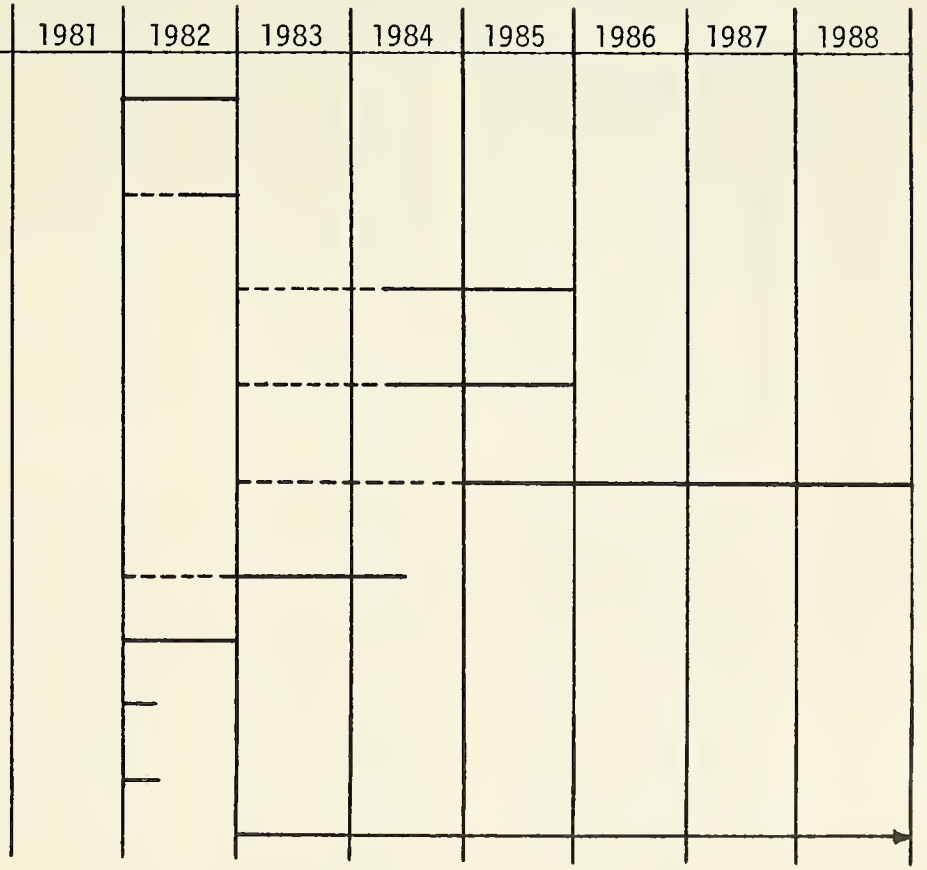
TABLE XIII-1. CONSTRUCTION STAGING PROGRAM

Project Description	Responsible Agency	Capital Cost(1)
DWO Abatement Program	Boston	$ 100,000
Hoyt Street Regulator Modifications	Boston	90,000
Commercial Point Screening/ Disinfection Facility	MDC	3,030,000
Fox Point Screening/ Disinfection Facility	MDC	2,740,000
South Boston Storage/ Containment Facility	MDC	28,000,000
Pine Neck Creek Storm Drain Relocation	Boston	2,340,000
Cleaning of CSO Conduits	Boston	300,000
Dredging	Boston	40,000
Landfill at Outlet BOS-090	Boston	20,000
Best Management Practices	Boston	25,000
TOTAL		$36,685,000



NOTES:

(1) Based on June 1979 price levels (ENR 2900) and includes an allowance for engineering and contingencies

(2) Years shown as federal fiscal years: October 1 to September 30.

----- Step 2 - Final design including an allowance of 3 to 6 months for engineer selection, obtaining a Step 2 grant, and for obtaining requirements, permits and approvals.

——— Step 3 - Construction.

by each source are presented in this section. Also included are estimated increases in sewer use charges to typical residential customers within the Dorchester Bay study area.

Eligibility and Financing Sources. A summary of the estimated federal, state and local shares of each item of the recommended plan is shown on Table XIII-2. These were based on grant eligible cost criteria developed by the Lead Consultant for the entire CSO project and reviewed with the Environmental Protection Agency (EPA) and the Massachusetts Division of Water Pollution Control (DWPC). The primary purpose of developing this criteria was to estimate local costs and charges to typical residential users. The actual determination of eligible and ineligible costs will be performed on a case by case basis by the EPA and DWPC based on a review of the completed facilities plan.

As presently conceived, CSO storage and treatment systems, including CSO consolidation conduits and connections to existing sewerage system facilities, are eligible for 75 percent federal and 15 percent state funding. This would include the two Dorchester screening/disinfection facilities and the South Boston storage/containment facilities. Also eligible are modifications to existing facilities that improve their performance which would include the proposed Hoyt Street regulator modifications.

In order to meet the coliform standards in the southern section of Dorchester Bay, existing pollutant loads from dry weather overflows (DWO's), CSO's and separate storm drainage systems must be mitigated. During the assessment of the existing situation (Chapter IX), it was shown that with DWO's removed, the total coliform concentration in the Tenean Beach modeling grid exceeded SB water quality standards. Of the remaining calculated total coliform concentrations, the HMC results showed that approximately 50 percent was attributed to separate storm runoff. The recommended plan does not include the total elimination of CSO outlet BOS-090 loads, but rather a reduction in the total annual amount. Accordingly, on a long term basis, a reduction in the annual total coliform loads from the storm drains tributary to the Tenean Beach area is required if SB standards are to be met. Of the approximate total of 150 acres of separate storm drainage area tributary to the Tenean Beach area, 118 acres is tributary to the Pine Neck Creek storm drain. Thus, the relocation of the Pine Neck Creek storm drain outlet is desirable if the SB water quality standards are to be met in terms of total coliform. Floatables are also an issue that must be addressed, and the relocation of this outlet would result in a mitigation of storm water related floatables to the Tenean Beach bathing area.

On a short term basis, the existing outlet's location contributes directly to the high coliform counts and the presence of floatables in the waters of Tenean Beach following a storm event. Thus, in order to mitigate these short term impacts of discharges near Tenean Beach, as well as the long term discussed above, it was recommended that the outlet be relocated away from the bathing area.

TABLE XIII-2. SUMMARY OF ESTIMATED COSTS AND FUNDING SOURCES FOR RECOMMENDED PLAN

Project	Estimated Capital Cost[1] Federal	State	Local	Total	Estimated Operating Cost[2] Local	Local Sharee
1. Dry Weather Overflow Abatement Program	$ --	$ --	$ 100,000	$100,000	$ --	City of Boston
2. Hoyt Street Regulator Modifications	68,000	13,000	9,000	90,000	--	City of Boston
3. Commercial Point Screening/Disinfection Facility	2,272,000	455,000	303,000	3,030,000	21,000	MDC
4. Fox Point Screening/ Disinfection Facility	2,055,000	411,000	274,000	2,740,000	22,000	MDC
5. Cleaning of CSO Conduits	--	--	300,000	300,000	--	City of Boston
6. South Boston Storage/ Containment Facilities	21,000,000	4,200,000	2,800,000	28,000,000	38,000	MDC
7. Pine Neck Creek Storm Drain Relocation	1,755,000	351,000	234,000	2,340,000	--	City of Boston
8. Dredging	--	--	40,000	40,000	--	City of Boston
9. Landfill at Outlet BOS-090			20,000	20,000	--	City of Boston
10. Best Management Practices	--	--	25,000	25,000	200,000	City of Boston
TOTAL	$27,150,000	$5,430,000	$4,105,000	$36,685,000	$281,000	

NOTES: (1) Includes design and construction expressed in June, 1979 dollars (ENR 2900).
(2) Expressed as $/yr. in June, 1979 dollars (ENR 2900).

Since this recommendation is required to meet SB standards and also to reduce short term impacts to the Tenean Beach bathing area, it has been included as an eligible item on Table XIII-2. This is based on EPA's Program Requirements Memorandum (PRM) 75-34 which states in Section II that "The policy of the Agency (EPA) is, therefore, that construction grants shall not be used for construction of treatment works to control pollution from separate discharges of stormwater except under unusual conditions where the project clearly has been demonstrated to meet the planning requirements and criteria described above for combined sewer overflows."

Ineligible costs, which would be borne entirely by the local sharee (either the MDC or the City of Boston as shown in Table XIII-2), include the detailed field evaluation of the existing system to locate dry weather overflows, catch basin cleaning, regulator and tide gate inspection and maintenance, sewer cleaning, dredging, repairs to existing facilities and operation and maintenance costs of proposed CSO control facilities. In addition, estimated annual operating costs of the recommended CSO control facilities would be borne entirely by the MDC. The allocation of local cost shares between the MDC and the City of Boston is based on the proposed arrangement of MDC and community responsibilities for implementation of the recommended plan. Under the proposed implementation arrangement, the MDC would undertake projects which intercept, store and treat CSO; and member communities in the study area would be responsible for improvements within their collection systems. For the Dorchester Bay study area, the member community would be the City of Boston.

The MDC cost shares in Table XIII-2 would be ultimately apportioned back to the 43 member communities of the Metropolitan Sanitary District (MSD). The apportionment of the MDC cost shares is discussed subsequently.

MDC Sewerage Division Cost Apportionment. Based on discussions with the MDC, it is expected that the Sewerage Division of the MDC would construct and operate the CSO control projects undertaken by the MDC (Table XIII-2). Sewerage Division costs for annual operation (including administration), maintenance and replacement of facilities, as well as annual principal and interest charges, are apportioned among the 43 MSD member communities. The communities are required to pay annually their MSD sewerage apportionments in accordance with Chapter 814 of the Massachusetts Acts of 1975.

The present method of apportioning Sewerage Division costs among the member communities of the MSD is based on population ratios. Under the present method, O & M costs are apportioned based on ratios of contributing population* and major industrial wastewater flow population equivalents. Principal and interest charges are apportioned

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* Population served by MSD interceptors.

based on wastewater flow population equivalents. Table XIII-3 gives the present ratios of apportionment for the member communities.

The member communities raise revenue to cover the cost of annual MSD apportionments and the communities' own collection system O & M expenses by billing their residential, commercial, industrial and institutional customers. The community (i.e., City of Boston which contains the Dorchester Bay Study area) financing methods are discussed later in this chapter.

The MDC Sewerage Division is presently updating its method of apportioning costs to the member communities in conformance with EPA requirements for sewer use charge systems. The Sewerage Division's new cost apportionment system and the new computational methodology for cost apportionments is expected to be completed this year (1980). For the purpose of estimating charges to typical residential accounts, the existing ratios of apportionment were utilized. Upon completion of the new system of cost apportionment, the estimated CSO project charges to typical residential customers should be reviewed.

Expected Method of MDC Financing. In the past, the Sewerage Division of the MDC has typically financed its major wastewater collection and treatment improvements through bond sales. Based on discussions with the MDC, the sale of 20 year 7.5 percent bonds was assumed as the method of financing.* Further, it was assumed that the bonds would be retired through constant payments of principal and interest. Thus, for each $1,000,000 of principal, $961,800 of interest would be paid.

Municipal Sewer User Charges. MSD member communities** presently use either ad valorem taxes, or actual use charges, to finance wastewater collection costs. Ad valorem taxes (property taxes) are currently used in Brookline, Chelsea and Somerville, along with most of the other 38 member communities of the MSD. Boston and Cambridge have user charge systems based on actual water use, either metered or estimated.

The City of Cambridge user charge system has been approved by the EPA. Approval of the Boston Water and Sewer Commission (BWSC) user charge

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* Since January 1980, interest rates have risen substantially. The 7.5 percent rate is relatively consistent with the ENR 2900 cost estimate base.

**Communities other than the City of Boston, which includes the Dorchester Bay Study Area, are mentioned herein for comparison purposes.

TABLE XIII-3. SCHEDULE OF RATIOS OF CONTRIBUTION FOR APPORTIONMENT OF MDC SEWERAGE DIVISION DEBT SERVICE AND OPERATION & MAINTENANCE COST

City or Town	1975 Census Population	1979 Contributing Population	Population Equivalent of Major Industries (50,000 gpd)	Ratio Operation & Maintenance[2] FY 1979	Ratio for Principal Interest[3] FY 1980
Boston[1]	639,061	638,183	47,853	0.313046	0.290276
Brookline	53,150	53,136	0	0.024247	0.022460
Cambridge	102,095	102,072	41,438	0.065485	0.060654
Chelsea	25,066	25,030	1,761	0.012225	0.011337
Somerville	80,596	80,507	551	0.036988	0.034291
SUBTOTAL	899,968	898,928	91,603	0.451991	0.419018
38 Other MSD Communities	1,286,059	1,112,166	88,788	0.548009	0.580982
TOTAL	2,186,027	2,011,094	180,391	1.000000	1.000000

(1) Contains the Dorchester Bay study area.
(2) Based on sum of contributing population and industrial population equivalent.
(3) Based on sum of 1975 census population and industrial population equivalent.

Source: MDC Sewerage Division 60th Annual Report (Fiscal year ending June 30, 1979).

system and the ad valorem systems of the other study area communities has yet to be determined.

The EPA is presently requiring that communities obtain approval of their user charge systems prior to the award of new Step 3 grants.* The EPA is also requiring that all MSD member communities obtain approval of their user charge systems, before the award of new Step 3 grants to the MDC.* Chapter 814 of the Acts of 1975 authorizes the MDC to develop user charge systems for the member communities, if required to expedite MDC's eligibility for a federal or state grant award.

Based on discussions with the EPA, it is expected that the approval of member community user charge systems will be determined during the application for a future Step 3 grant by the communities or the MDC.

Expected Method of Municipal Financing. Under the recommended plan for the entire MDC CSO Project, the five communities in the study area would share three types of CSO control costs. The three types of costs are:

(1) The community's apportionment of additional MDC Sewerage Division principal and interest and O & M charges for the MDC's CSO control improvements;

(2) The community's own capital costs of new collection system improvements for CSO control (if any); and

(3) The community's own O & M costs of new management and maintenance programs for CSO control.

Additionally, the 38 member communities outside of the study area would share a portion of the MDC Sewerage Division principal and interest and O & M costs for CSO control.

The method of financing the new costs for CSO control in the 5 study area communities and in the 38 outlying communities is expected, ultimately, to be by new actual use type user charge systems, or by continued reliance on ad valorem systems, if approved by the EPA. Under either system, each community's costs would be shared by its residents, businesses, industries, utilities and institutions. Costs to community residents are of interest in this preliminary evaluation, and for estimating purposes, it was assumed that the relative share of community sewer service costs paid by the residents would not appreciably change. Other considerations that apply to City of Boston (i.e., BWSC) financing are discussed below.

The BWSC would be responsible for funding a portion of the capital costs under the recommended plan, along with new annual O & M costs and additional MDC Sewerage Division cost apportionments. Based on a review

*EPA may provide up to 80 percent on new Step 3 grants without approved user charge systems.

of a recent financial analysis report for the BWSC, a 7.5 percent interest rate and 20-year term bonds were assumed for financing capital costs. Principal and interest payments for such bonds were previously described in this chapter. It was assumed that these payments and new O & M costs and additional charges for MDC Sewerage Division apportionments would be financed through higher sewer user charges.*

Estimated Charges to Typical Residential Customers. The CSO Project is one of a number of wastewater management projects currently being undertaken by the MDC and the local communities. Sewer use charges could be expected to rise in the future, due to the sum of the cost of several projects. For example, a recent report prepared for the BWSC on its financing and revenue needs, projected that Boston's water and sewer rates could increase by 66 percent through 1989 due to the cost of BWSC's capital improvements, the cost of increased apportionments from the MDC, and inflation. Efforts by the BWSC to reduce the amount of un-accounted for water through improved metering, which are expected to slow the rise in the rates, were factored into the projection.

Charges to typical residential customers for the cost of the CSO Project alone were estimated by the Lead Consultant as follows. First, present charges for existing wastewater O & M costs and principal and interest charges were determined. Then, additional charges for O & M and principal and interest under the CSO Project were estimated. The estimated additional charges are presented in comparison to present charges in order to demonstrate the relative cost of the CSO Project. The details of this approach are described in the following sections.

Present Charges. In Boston and Cambridge, the charges were determined based on 1980 sewer use rates, estimated per capita water consumption, and average number of persons per household. 1980 residential sewer use rates in Boston and Cambridge are, respectively, $0.359 and $0.31 per 100 cubic feet of metered (or estimated) water consumption. Census data and communications with community assessors resulted in the following estimates of persons per household:

Community	Average Number of Persons per Household
Boston	2.9
Cambridge	2.8
Brookline	2.3
Chelsea	3.0
Somerville	2.8

*The BWSC is currently undertaking a program to upgrade residential and city building water meters in Boston. The BWSC expects that improved metering will help to keep water and sewer rates from rising as fast as the cost of sewer service. However, the beneficial effect of this program has not been included in the estimates for this report.

In Brookline, Chelsea and Somerville, the method for determining charges to typical residential customers was as follows. The total cost for sewer service was defined as the sum of the MDC Sewerage Division apportionment to the community, plus the community's own municipal expenses for sewer O & M and improvements. The total cost is shared by residents, businesses, industry and institutions. In order to obtain the fraction of the total sewer service cost paid by residents, data were obtained on the present residential share of property tax levies in the communities. Data on contributing population and average number of persons per household were then used to estimate present charges.

Present charges to typical residential customers within the entire MDC CSO Project study area vary significantly among the five communities. The variation is primarily due to the size of the communities own collection system and the relative fraction of the property tax levy paid by residents versus business and industry. Using the methodology described above and allowing for some variation in household size, the following costs were determined by the Lead Consultant:

Boston, and Cambridge ..... $30 to $36/household per year

Brookline, Chelsea and Somerville.... $24 to $30/household per year

Estimated Additional Charges for the CSO Project. The estimated future additional charges to typical residential customers required to finance the cost of CSO Project recommendations were determined by the Lead Consultant. The method generally consisted of multiplying present charges by the ratio of CSO Project costs to present costs for wastewater collection and treatment.

Similar to the present charges, the estimated additional charges to typical residential customers of the study area vary among the five communities. The estimated additional charges vary from about $4.0 per year in Brookline, to about $5 to $6 per year in Boston, Cambridge, Chelsea and Somerville. The variation in cost results largely from the proposed arrangement of responsibilities for CSO control.

Estimated Charges for Study Area CSO Controls. These estimated charges per household include the cost of all recommendations under the entire MDC CSO Project. Also determined by the Lead Consultant was the cost to study area residents for only the particular study area recommendations. They were developed using the methodology described previously, but considering only the cost for the particular study area. For the Dorchester Bay study area, the estimated additional charge per household per year that would result from construction and implementation of the recommended plan, as described in Chapter XII, is $1.50. Since the present annual household charges range between $30 and $36, this additional charge represents an increase of 4 to 5 percent.

Legal and Institutional Issues

Presented in this section are the legal and institutional issues pertaining to imlementation of each item of the recommended plan. Included are discussions on permits, licenses, approvals, property acquisition, regulatory requirements and legislation. Information presented in this section is based on the applicable legal and institutional issues that have been identified as of this writing by the Lead Consultant and the Dorchester Bay Area Consultant. Accordingly, these issues should be reviewed during Step 2 and Step 3 planning and revised as required to reflect changes in requirements, if any, by concerned agencies.

Regulatory Agency Jurisdiction, Requirements and Permits. A description of regulatory agency jurisdictions and their required permits, licenses and approvals as they apply to the components of the recommended plan is presented in this section.

U.S. Army Corps of Engineers. The Corps of Engineers (COE) has jurisdiction over all navigable waters of the United States, particularly relating to the dredge and fill, the disposal of dredged spoil, and the construction of dams and dikes in navigable waters*, and the alteration of harbor lines. The authority for such jurisdiction is derived from:

- PL 92-500, Section 404 (a)** - Dredge or Fill Activities
- PL 92-532 - Ocean Disposal of Dredged Spoil
- Rivers and Harbors Act, 1899, Section 9 - Dams and Dikes in Navigable Waters
- Rivers and Harbors Act, 1899, Section 10 - Construction or Alteration in Navigable Waters
- Rivers and Harbors Act, 1899, Section 11 - Alteration of Harbor Lines

As discussed in Chapter XII, a permit from the COE will be required for the recommended dredging at CSO outlets, primarily relating to the disposal of dredged spoils. The present procedure involves sampling and analysis of the material to be dredged and, based on these results, issuance of a permit by the COE for off-shore disposal of the spoils at a designated fowl dump area (currently located about 15-miles off of Manchester, Mass. harbor).

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* Navigable waters are defined as those that have a flow of 5 cfs or greater, or a depth of at least 10 feet.
**Section,404(a) was slightly modified by PL 95-217.

U. S. Environmental Protection Agency (EPA). EPA regulates the point source discharge of all pollutants into the waters of the United States in accordance with Section 402 of the Federal Water Pollution Control Act Amendments of 1972, P.L. 92-500. Any point-source discharge must be permitted by EPA through the issuance of an NPDES permit. The Massachusetts Division of Water Pollution Control administers the issuance of such permits as discussed below.

Massachusetts Division of Water Pollution Control (DWPC). The DWPC administers the issuance of NPDES permits for the Commonwealth, under the Federal Water Pollution Control Act Amendments, P.L. 92-500, Section 402, and the issuance of Water Quality Certification, P.L. 92-500, Section 401. Water Quality Certification must be acquired by all NPDES recipients to confirm that the discharge is in compliance with the objectives of 92-500. An NPDES permit would be required for the South Boston CSO outlets BOS-081 through BOS-087 since, under the recommended plan, the most cost-effective control level would result in an estimated average of 4 overflow occurances per year. The Dorchester CSO outlets BOS-088, 089 and 090 would also be included in the permit since CSO discharges would occur on estimated average of 24 times per year from BOS-089 and 090. The waste stream from these outlets would be screened for floatables removal and disinfected for coliform reduction during the summer bathing season. Outlet BOS-088 serves only as hydraulic relief for its tributary system, and activates an estimated average of only once per year. The NPDES permits for all study area CSO outlets would, most likely, include monitoring of the outlets to assure that discharges comply with the control levels recommended in this facilities plan.

Massachusetts Executive Office of Environmental Affairs (EOEA). The EOEA administers the Massachusetts Environmental Policy Act (MEPA). Similar to NEPA, the Massachusetts Act requires an environmental review of all major construction activities. In advance of such activities, an Environmental Notification Form must be filed with the EOEA in accordance with Chapter 30, Sections 61 - 62h, Massachusetts General Laws, amended on January 25, 1979.*

The Executive Office of Environmental Affairs is comprised of five departments, two of which of importance in the CSO Project are the Department of Environmental Management and the Department of Environmental Quality Engineering. The role of these departments in the regulatory review is discussed below.

Massachusetts Department of Environmental Management (DEM). The DEM administers the permitting of activities in coastal and inland wetlands, under Section 105 of Chapter 130 and Section 40A of Chapter 131. The DEM is authorized to restrict the use of such wetlands. DEM also administers the Ocean Sanctuaries Act, which restricts activities in most coastal waters of the Commonwealth, Chapter 132 A, Sections 13-17. However, Boston Harbor is not included in the jurisdiction of that Act. Accordingly, no components of the recommended plan are expected to require a DEM permit.

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*The ENF's for this facilities plan, as well as the three other plans under the overall MDC CSO Project, have been filed during Step 1.

Massachusetts Department of Environmental Quality Engineering (DEQE). The DEQE is comprise of nine major groups, three of which are of particular importance for the CSO Project. The Shellfish Sanitation Section enforces State regulations dealing with shellfishing. No permits are expected to be required from this concern, however, since the DEQE is responsible for classifying shellfish areas, and continually monitors the pollutant levels in the water column and in the shellfish, they would decide upon the classification of shellfish beds in Dorchester Bay upon implementation of the recommended plan.

Division of Waterways.* The Division of Waterways administers the construction, filling, dredging, etc., in tidal harbors and certain rivers, in accordance with Chapter 91, Sections 1-59, and the disposal of dredged spoil, in accordance with Chapter 21A, Section 14. Application for a license to conduct such activities is submitted directly to the Divison. This would be required for the recommended dredging at CSO outlets, and for the recommendations associated with the landfill at CSO Outlet BOS-090.

Local Conservation Commissions. Conservation Commissions permit the use of coastal and inland wetlands through Orders of Conditions issued by them, in accordance with Chapter 130, Section 105 and Chapter 131, Section 40A. To acquire such a permit, a Notice of Intent is filed with the Conservation Commission. The Orders of Conditions may be appealed to DEQE.

Massachusetts Historical Commission (MHC). The MHC, acting as the State Historic Preservation Officer, is authorized to review public projects in order to assess their impact on historic and archaelogical properties. Under Section 27B, Chapter 9 of the Massachusetts General Laws, the Commission was mandated to administer the Federal Historic Preservation Program. Requests for review of proposed projects are submitted directly to the Commission. All structural recommendations would be reviewed by the MHC.

Property Acquisition. Property acquisition includes the following:

- o transfer to the MDC Sewerage Division of public land and land held by other government agencies and MDC Divisions
- o acquisition by the MDC of temporary and permanent easements.

A portion of the South Boston storage/containment facility would be located beneath the MDC-owned parkland adjacent to the southern end of Carson Beach (Figure XII-2). In addition, the Commercial Point screening/disinfection facility would be located in the MDC-owned McMorrow Park along Victory Road (Figure XII-23). In both instances, a transfer of a portion of park land from the MDC Parks and Recreation Division to the MDC Sewerage Division would be required. It is understood that the MDC must request state legislation for any use of public land unless the particular use and land is explicity itemized in

*Now called the Division of Land and Water Use.

enabling legislation authorizing the project. In general, with the CSO project, it is anticipated that any use of state or municipal parkland will require state legislation. This restriction on the use of parkland may apply to MDC parkland, thus, an internal transfer of ownership of MDC land between the Parks Division and the Sewerage Division may require state legislation.

The proposed site of the Fox Point screening/disinfection facility (Figure XII-24) is currently owned by the Massachusetts Department of Public Works (MDPW) and leased to the Dorchester Yacht Club. Discussions with both concerns indicates there should be no constraints in the acquisition of this parcel by the MDC. Temporary use during construction of a small portion of McConnell Park (owned by the City of Boston) would also be required to construct the diversion conduit and control gate. Also, a permanent easement would be required by the MDC to allow for access to the control gate. Accordingly, state legislation would, most likely, be required for utilization of the parkland for the reasons mentioned above. All other structural facilities would require acquisition by the MDC of temporary and permanent easements. The consolidation conduit would require the MDC Sewerage Division to obtain an easement from the MDC Highway Division which has jurisdiction of Day Boulevard. For construction of the Pine Neck Creek storm drain relocation, the MDC would obtain an easement from the City of Boston for construction in city-owned streets. For the portion of the new conduit passing through the Shaffer Realty Company parcel (Figure XII-27), the acquisition of a temporary construction easement and a permanent easement would be required from this concern. Discussions with Shaffer indicated there should be no significant constraints in acquiring these easements.

Legislation. Actions required by the State legislature and community governments for plan implementation are described in this section. For the purpose of discussing these actions, three types of projects are considered. These are:

1. new construction and property acquisition by the MDC;

2. insystem modification and construction on property currently owned by the MDC; and

3. projects undertaken by the local communities.

1. New Construction and Property Acquisition by the MDC. State legislation will be required to increase the MDC's authorization for CSO control expenditures beyond the authorization provided by Chapter 803 of the Acts of 1972 and Chapter 481 of the Acts of 1976. These acts provide the authorization for spending for planning and final design of the CSO Project, along with certain other projects.

It is anticipated that the MDC will obtain legislative authorization for construction prior to proceeding with final design of projects which involve property acquisition and new construction. The DWPC has expressed interest in seeing that the MDC has authority to acquire property required to implement the recommended plan before the DWPC provides

funding. The time required to obtain the legislation is estimated at 24 months from the time that the draft facilities plans are submitted to the EPA and the DWPC (mid-1980). The 24 month duration assumes that the regulatory agencies can complete their review in early 1981. Legislation would then be prepared prior to the filing date for the 1982 legislative session (December 1981), and that authorization would be received in mid-1982. Step 2 grants would then be applied for approximately at the start of federal fiscal year 1983 (October, 1982). Therefore, the Step 2 for projects which involve new construction and property acquisition by the MDC is estimated to start at the beginning of FY1983.

2. Insystem Modifications and Construction on Property Currently Owned by the MDC. Step 2 and Step 3, on the insystem modifications (i.e., Hoyt Street regulator modifications) and construction on MDC property may start prior to the major legislation mentioned above. It is assumed that MDC can start the modifications in mid-1981. For estimating the staging, it was assumed that the Step 2 grant would be applied for after legislation in mid-1981 and that Step 2 would start at the beginning of federal fiscal year 1982. Therefore, the Step 2 projects which involve insystem modifications and construction on property owned by the MDC were estimated to start at the beginning of FY 1982.

3. Projects Undertaken by the Local Communities. Each of the local communities -- Boston, Brookline, Cambridge, Chelsea, and Somerville -- have been proposed to be responsible for some work under the CSO Project. It is anticipated that these communities' projects will be made part of the implementation schedules of the communities' NPDES permits.

For estimating purposes, it was assumed that actions by the local communities to encumber their local shares will require at least 12 months. Therefore, the Step 2 projects which will be undertaken by the local communities were estimated to start at the beginning of FY1982.

Recommended Implementation Plan

The actions required to implement the recommended plan are presented in this section. These actions are based on current regulatory agency requirements and property acquisition procedures and may require updating in the future. They are presented in order of occurrence.

1. MEPA Compliance

   Input: Draft facilities plan report
   Output: EOEA certification of compliance with MEPA

2. DWPC/EPA Municipal Facilities Branch Review

   Input: a) Draft facilities plan reports
          b) EOEA certification of compliance with MEPA
   Output: a) Step 1 planning approval
           b) Final reports and design packages

3. NEPA Compliance

Input: EOEA certification of compliance with MEPA
Output: FNSI or mitigation measures or modifications to recommended plan

4. Construction Grants Program Priority System

Input: a) Step I planning approval
b) Construction staging program (per final reports)
Output: CSO projects priority listing on Massachusetts Priority List

5. NPDES Permit

Input: a) Step I planning approval
Output: MDC NPDES permit and/or Enforcement Compliance Schedule

6. Water Quality Certification

Input: NPDES Permit
Output: Letter of Water Quality Certification

7. Property Acquisition

Input: a) Step I planning approval
b) Final report and design packages
Output: Statement of Site availability

8. Local Funding

Input: a) Statements of site availability
b) Step I planning approval
c) Final facilities plan with cost estimates
Output: Statements of encumbered funds for Step II grant application

9. Engineering Consultant Selection

Input: a) Priority List
b) Statement of encumbered funds
c) Design packages
Output: Consultant for final design Step II cost

10. OMB Circular No. A-95 Clearinghouse Review

Input: Priority List
Estimate of Step II Cost
Output: Clearinghouse response (sign-off or comments)

11. Step II Funding

Input: a) A-95 Clearinghouse comments
b) Priority List
c) Statement of encumbered funds
d) EOEA certification of compliance with MEPA
Output: Acceptance of grant award

12. Preparation of Final Design Plans and Specifications

Input: a) Consultant for final design
b) Acceptance of grant award
Output: 100 percent complete contract documents

13. Value Engineering

Input: 25 percent complete final design
Output: Value Engineering Report

14. Sewer Connection/Extension Permit

Input: a) NPDES Permit
b) Facilities plan reports
Output: DWPC sewer connection/extension permit

15. Wetlands Orders

Input: a) 75 percent complete plans
b) Water quality certification
c) EOEA certification of compliance with MEPA
d) Statement of site availability
e) All obtainable local permits, approvals, variances*
Output: Order of Conditions governing activities in wetlands

16. Massachusetts Construction License

Input: a) 80 percent complete plans
b) Order of Conditions
c) Water quality certification
d) EOEA certification of compliance with MEPA
Output: Massachusetts Construction License or Authorization

17. Corps of Engineers Permit

Input: a) Water quality certification
b) Massachusetts construction license
c) 90 percent complete plans and specifications
Output: Corps of Engineers Permit

18. COE/EPA Biddability Review

Input: 90 percent complete plans and specifications
Output: COE/EPA comments

19. Utility and Municipal Permits

Input: 90 percent complete plans and specifications
Output: Initiation of utility and municipal permits

20. Coast Guard Agreement

Input: a) 90 percent complete plans and specifications
b) Massachusetts construction license
Output: Aids to Navigation Agreement

21. EPA/DWPC Review

Input: Completed plans and specifications
Output: Step II final design approval

22. Priority System

Input: Step II final design
Output: Priority listing of projects

23. Local Funding

Input: a) Step II final design approval
b) Priority list
Output: Statement of encumbered local funds

24. Step III Grant Funding

Input: a) Priority list
b) A-95 comments
c) User charge systems
Output: Acceptance of grant award

25. Construction Step Grant Conditions

Input: Acceptance of grant award
Output: Construction Completion

Section 2

APPENDICES

APPENDIX A - Field Inspection and Flow Monitoring Results
Conduit and Junction Data for TRANSPORT Block

APPENDIX B - Report on the Unified Interceptor Modeling

APPENDIX C - Reports by Haley and Aldrich, Inc. on Foundation Requirements and Construction Procedures for Major Structural Recommendations

APPENDIX D - Bibliography

APPENDIX A

Field Inspection and Flow Monitoring Results

Table A-1 Inventory of Regulators

Table A-2 Inventory of Tide Gates

Table A-3 Summary of MDC Tide Gate Rehabilitation Program for the Dorchester Bay Study Area

Dry Weather Flow Monitoring Results

Conduit (Link) and Junction (Node) Data for TRANSPORT Block

TABLE A-1

INVENTORY OF REGULATORS

The following table represents the results of the regulator inspection program. The location of each regulator described in the table is shown on Figures B through D, appended. The three major types of regulators found within the study area are described in detail in Chapter IV and shown on Fig. IV-5. Regulators that vary in configuration or in operation from the three major types are described in the table. The following symbols are used in the table to describe sewer shapes and construction materials. Unless otherwise noted, pipe is circular.

Sewer Shapes:	Construction Materials:
(H) = horseshoe	C = concrete
(R) = rectangular	R.C. = reinforced concrete
(MC) = modified circle	B = brick
(E) = egg	V.C. = vitrified clay
(OV) = oval	
(U) = U-shaped	

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
1. Sump with overflow weir type regulator on First St. between Farragut Rd. & P St.	30" x 36" (U) C	S. Boston Interceptor (South Branch)	12" V.C.	24" B	Flap gate covering dry weather connection is stuck in closed position. 8/22/78
2. Sump with overflow weir-type regulator on Second St. at Farragut Rd.	30" x 36" (U) C	S. Boston Interceptor (South Branch)	15" V.C.	30" x 36" (U) C	Regulator is clean and functioning properly. 8/22/78.
3. Sump with overflow weir type regulator on Farragut Rd. at E. Sixth St.	15" x 20" (E) B	S. Boston Interceptor (South Branch)	15" V.C.	15" x 20" (E) B	Dry weather flow outlet is blocked. All flow is diverted to overflow channel. 8/22/78, 2/7/79 (Described in Chap. IV)
4. Sump with overflow weir type regulator on Marine Rd. at N St.	36" x 48" (E) B	S. Boston Interceptor (South Branch)	12" V.C.	36" x 48" (E) B	Regulator is functioning properly. Dry weather flows to interceptor. 8/22/78
5. Sump with high outlet type regulator on Marine Rd. at K St.	24" B	S. Boston Interceptor (South Branch)	12" V.C.	24" x 27" (OV) B	Regulator is functioning properly. Dry weather flows to interceptor. 8/22/78
6. Side overflow weir type regulator on I St. at E. Eighth St.	20" x 30" (E) B	E. Eighth St. Sewer	20" x 30" (E) B	18" V.C.	Regulator is functioning properly. Dry weather flows to E. Eighth St. Sewer. 8/23/78

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
7. Sump with overflow weir type regulator on Marine Rd. at H St.	60" x 62" (MC) B	S. Boston Interceptor (South Branch)	15" V.C.	60" B	Regulator is functioning properly. Dry weather flows to interceptor. 8/23/78
8. Side overflow weir type regulator on Columbia Rd. opposite house #1306. Connection of S. Boston Interceptor to Columbus Park Headworks.	36" x 54" (E) B	S. Boston Interceptor (South Branch)	36" x 54" (E) B	36" R.C.	Regulator is functioning properly. Dry weather flows to interceptor. 2/7/79
9. Sump with overflow weir type regulator on Columbia Rd. opposite house #1226.	66" x 72" (MC) B	S. Boston Interceptor (South Branch)	15" V.C.	60" x 60" (R) B	Regulator is functioning properly. Small amounts of sludge in sump. Dry weather flow to interceptor. 8/23/78
10. High outlet weir type regulator on S. Boston Interceptor in Sterling Sq. opposite house #14.	72" B	S. Boston Interceptor (Trunk Section)	72" B	124" x 75" (H) B	Regulator is functioning properly. Dry weather flows to interceptor. 8/23/78
11. Sump with overflow weir type regulator on Old Colony Ave. at Logan Way.	54" x 58" (MC) B	S. Boston Interceptor (Trunk Section)	15" V.C.	48" B	Regulator is functioning properly. Dry weather flows to interceptor. 8/23/78
12. Side overflow weir type regulator on Crescent Ave. at Carson St.	32" x 40" (OV) B	Crescent Ave. Sewer	32" x 40" (OV) B	45" B	Regulator is functioning properly. Some sediment in dry weather flow outlet. Dry weather flows to interceptor. 8/23/78

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
13. Side overflow weir type regulator in easement near intersection of Sydney St. and Crescent Ave.	24" C	Dorchester Interceptor	24" V.C.	48" B	Regulator is functioning properly. Dry weather flows to interceptor. 8/23/78
14. High outlet type regulator with orifice connection on Morrisey Blvd. at Mt. Vernon St. - connection of Dorchester Interceptor to Boston Main Interceptor.	60" R.C.	Boston Main Interceptor	24" (C.I.) 30" (C.I.)	60" R.C.	Regulator is functioning properly. Dry weather flows to interceptor. 8/23/78
15. Sump with overflow weir type regulator on Savin Hill Ave. at Auckland St.	24" x 27" (OV) B	Dorchester Interceptor	12" V.C.	24" V.C.	Dry weather flow connection blocked 8/23/78. (Described in Chap. IV.) Cleaned by Boston & Water Sewer Comm. 9/19/78. Regulator functioning properly 2/7/79.
16. High outlet type regulator with orifice connection on Bowdoin St. near Hancock St.	24" x 28" (OV) B	Hancock St. Sewer	18" C.I. to 24" x 31" (OV) B	18" V.C.	Regulator is functioning properly. Dry weather flows to Hancock St. Sewer. 8/23/78
17. High outlet type regulator with orifice connection on Hancock St. near High St.	24" x 31" (OV) B	Hancock St. Sewer	16" C.I. to 24" x 31" (OV) B	18" V.C.	Inaccessible.
18. Sump with high outlet type regulator on Dorchester Ave. approximately 500 ft. north of Hoyt St.	36" x 48" (OV) B	Dorchester Interceptor	24" V.C.	60" B	Regulator is functioning properly. Dry weather flows to interceptor. 9/6/78

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
19. Sump with high outlet type regulator on Dorchester Ave. at Hoyt St.	38" x 57" (OV) B	Dorchester Interceptor	15" V.C.	36" x 48" (B)	Regulator is functioning properly. Dry weather overflows to interceptor. 2/7/79
20. Side overflow weir type regulator on Dorchester Interceptor on Auckland St. ext. in S.E. corner of National Laundry parking lot.	60" B	Dorchester Interceptor	60" B	60" B	Daily fluctuations in dry weather flow may cause overflows 8/23/78. (Described in Chap. IV). At lower flows regulator functioning properly.
21. Sump with high outlet type regulator on Freeport St. at Kimball St.	24" x 30" (E) B	Dorchester Interceptor	12" V.C.	48" B	Regulator is functioning properly. Dry weather flows to interceptor. 2/7/79
22. Sump with high outlet type regulator on Freeport St. near Orchardfield St. on 36" x 48" brick sewer.	36" x 48" (E) B	Dorchester Interceptor	24" V.C.	48" B	Regulator is functioning properly. Dry weather flows to interceptor. 2/7/79
23. Side overflow weir type regulator on overflow conduit between Expressway and MBTA tracks - regulates CSO's to outlet at Fox Point.	168" x 130" (U)C	None (C.S.O. Regulator)	---	96" x 120" (R) R.C.	Regulator is on C.S.O. conduit and serves to control flows to outlets BOS-088 and BOS-089. (Described in Chapt. IV).
24. Sump with overflow weir type regulator on Bay St. @ intersection of Bay St. and Auckland St.	28" x 36" (E) B	Dorchester Interceptor	12" V.C.	36" B	Dry weather flow connection blocked. Cleared by CDM field crew on 9/7/78. Regulator is now functioning properly. 2/7/79. (Described in Chap. IV.)

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
25. Side overflow weir type regulator on Geneva Ave. at Tonawanda St.	28" x 35" (E) B	Geneva Ave. Sewer	28" x 35" (E) B	43" x 72" (R) B	Regulator is functioning properly. Dry weather flows to Geneva Ave. Sewer. 2/7/79
26. High outlet type regulator with orifice connection on Leroy St. opposite house #35.	12" V.C.	Leroy Street Sewer	12" V.C.	18" V.C.	Regulator is plugged. Cleaned by Boston Water & Sewer on 9/21/78 & 10/26/78. Must continuously be cleaned to operate properly. (Described in Chap IV.)
27. Side overflow weir type regulator on Josephine St. at the corner of Ditson St.	12" V.C.	Josephine St. Sewer	12" V.C.	27" C	Regulator is functioning properly. Dry weather flows to sanitary sewer. Overflow pipe appears to flow to large storm drain. 8/24/78, 2/7/79
28. Side overflow weir type regulator on Park St. at Marlowe St.	24" x 36" (E) B	Park Street Sewer	12" V.C. to 24" x 36" (E) B	30" C	Regulator is functioning properly. Dry weather flows to Park Street sewer. 8/31/78, 2/7/79
29. Side overflow weir type regulator on Park Street opposite entrance to Bradlee's Shopping Center.	25" x 35" (E) B	Park Street Sewer	25" x 35" (E) B	36" B	Regulator is functioning properly. Dry weather flows to Park Street sewer. 8/31/78, 2/7/79
30. Side overflow weir type regulator on Dorchester Ave. at Gibson St.	28" x 36" (E) B	Gibson St. Sewer	32" x 42" (E) B	30" x 42" (E) B	Regulator is functioning properly. Dry weather flows to Gibson St. sewer. 8/31/78, 2/7/79

TABLE A-1 INVENTORY OF REGULATORS

Type and Location of Regulator	Combined Sewer at Regulator Size (Shape) Const. Material	Dry Weather Outlet to	Dry Weather Outlet Pipe Size (Shape) Const. Material	Combined Sewer Overflow Pipe Size (Shape) Const. Material	Observations and Date Checked
31. Side overflow weir type regulator on Adams Street at Christopher St.	33" x 36" (E) B	Adams Street Sewer	33" x 36" (E) B	36" B	Regulator is functioning properly. Dry weather flows to Adams St. sewer. 9/1/78, 2/7/79
32. High outlet type regulator on orifice connection on Park Street at Clayton Street.	32" x 42" (E) B	Clayton Street Sewer	24" C.I. to 36" x 48" (E) B	24" V.C.	Overflows are discharged to Dorchester Interceptor. 2/7/79
33. Manually controlled sluice gate on Dorchester Interceptor at South Siphon Chamber located in Sturtevant St. near Christopher St.	54" B	Dorchester Interceptor	54" B	168" 144" (H) B	Sluice gate with rising stem nut operator (closed). 9/14/78 2/7/79
34. Weir with orifice connection type regulator on Victory Road near Houghton Street	40" x 60" (E) B	Dorchester Interceptor	18" V.C.	68" x 72" (R) B	Regulator is functioning properly. Flap gate held open by chain on orifice pipe. 8/31/78, 2/7/79

TABLE A-2

INVENTORY OF TIDE GATES

The following table represents the results of the tide gate inspection program. Unless otherwise noted, all gates were in good working condition and functioning normally at the time of inspection. The location of all tide gates are shown on Fig's B through D, appended.

Note:

* Indicates those gates rehabilitated under the MDC tide gate rehabilitation program. Refer to TABLE A-3, herein, for a summary of the program for the Dorchester Bay Study Area.

TABLE A-2 INVENTORY OF TIDEGATES

Location and Conduit Size	Field Observations and Date Inspected
* First St. between P. St. & Farragut Rd. on 60" circular, brick, overflow conduit.	Circular, wooden gate closed @ low tide. No backflow observed through overflow conduit. 8/22/78
* Farragut Rd. near First St. on 72" x 72" U-shaped, concrete overflow conduit.	Gate is 60" x 72" top hinged rectangular, metal tidegate. Slight flow out. 8/22/78
* Columbia Blvd. at Farragut Rd. on 30" circular brick overflow conduit.	Gate is circular (18"Ø), metal and hinged at the top. Slight flow out visible at half tide. 8/22/78
* Columbia Blvd. at N St. extension on 36" x 48" egg-shaped brick overflow conduit.	Gate is circular (36"Ø), metal and hinged at the top. No flow in or out of conduit observed. Gate appears tight. 8/22/78
* Between Marine Rd. & Columbia Blvd. at H St. on 60" circular, brick overflow conduit.	2 gates in series. 36"Ø circular, metal top hinge. Low tide. No flow observed in or out of conduit. 8/23/78
* Between Marine Rd. & Columbia Blvd. near Carmony Court on 78" circular, brick, overflow conduit.	2 60" x 60" top hinge rectangular metal gates in series. No flow in or out of conduit observed at low tide. 8/23/78
* Sterling Square near regulator chamber on 124" x 75" horseshoe-shaped, reinforced concrete, overflow conduit.	Twin (48"Ø) circular top hinged metal gates in series. (4 tidegates in all.) No backflow observed. Gates appear tight. 8/23/78
* Columbia Road on overflow conduit leading to outlet BOS-086 (See Fig. B) (North)	Gate is 48" x 48" rectangular top hinged metal. Slight amount of deposition observed in chamber. Gate appears tight. 8/23/78
* Columbia Road on overflow conduit leading to outlet BOS-086 (See Fig. B) (South)	Gate is (36" Ø) circular top hinge (metal). Gate appears tight. 8/23/78.
* Sydney St. near Carson St. on 48" circular brick, overflow conduit.	(2-48"Ø) circular wooden double leaf tide gates in series. Gates observed to be stuck open. 9/19/78
* Carson Beach near shoreline on 120" x 120" rectangular, reinforced concrete overflow conduit leading to outlet BOS-087 (See Fig. B)	2 pairs of 90" x 96" rectangular wooden, tide gates in series. (manhole inaccessible) 8/23/78

TABLE A-2 INVENTORY OF TIDEGATES (Cont.)

Location and Conduit Size	Field Observations and Date Inspected
Between Southeast Expressway and MBTA tracks on twin 78" circular, reinforced concrete overflow conduits leading to outlet BOS-089.	Twin 72" x 96" rectangular, wooden, tide gates in parallel. (manhole inaccessible) 8/23/78
Located near Dorchester Yacht Club on 84" circular cast iron overflow conduits leading to outlet BOS-089.	Twin 72" rectangular metal, tide gates in parallel. (manhole inaccessible) 8/31/78
Bowdoin St. @ Navillus Terrace on 42" x 42" horseshoe-shaped concrete storm drain.	Manhole inaccessible. 8/31/78
Hancock St. @ Dewolf St. on 72" brick overflow conduit.	Manhole inaccessible 8/31/78
Dorchester Ave. approximately 200 ft. north of Hoyt St. on 48" x 48" rectangular concrete overflow conduit. (in front of National Laundry Co.)	Twin 60" rectangular wooden tide gates in series. (Top hinged) Gates appeared to be closed tight, no backflow observed. 9/6/78
Off of Dorchester Ave. in National Laundry Driveway on 96" x 162" horseshoe-shaped brick overflow conduit.	Wooden double doors hinged on side. Appeared to be stuck open. No tidal flow observed. 9/6/78.
Off of Dorchester Ave. in National Laundry Driveway on 24" circular, vitrified clay dry weather flow connection to Dorchester Interceptor.	Manhole inaccessible. 8/31/78
Auckland St. extension in National Laundry Co. parking lot on 64" x 72" rectangular reinforced concrete overflow conduit.	Manhole inaccessible. 8/16/78
Auckland St. extension in National Laundry Co. parking lot on connection between Dorchester Interceptor and 144" x 132" horseshoe-shaped, reinforced concrete overflow conduit.	Twin 60" rectangular wooden double leaf tide gates. Gates appear to be tight. 8/16/78

TABLE A-2 INVENTORY OF TIDEGATES (Cont.)

Location and Conduit Size	Field Observations and Date Inspected
Freeport St. near Kimball St. on 84" circular, brick overflow conduit leading to outlet BOS-089	Manhole inaccessible. 8/31/78
Freeport St. near Kimball and Orchenfield streets on 84" circular brick overflow conduit leading to outlet BOS-089.	Manhole inaccessible. 8/31/78
Off Morrissey Blvd. at Fox Point on 96" x 120" rectangular reinforced concrete overflow conduit leading to outlet BOS-089.	Manhole inaccessible. 8/31/78
Auckland St. at Bay St. on 64" x 72" rectangular reinforced concrete overflow conduit.	72"Ø circular wooden tide gate (top hinge) slightly leaking. 8/31/78
Park St. near Geneva Ave. on 36" circular brick overflow conduit at entrance to Bradlee's Mall.	Double leaf doors, appear to be stuck open. 8/31/78
Adams St. at Christopher St. on 168" x 144" horseshoe-shaped, brick overflow conduit leading to outlet BOS-090.	Tide gate appears to be missing. No tidal flow visible. 9/1/78
Victory Road opposite National Guard Armory on 48" circular brick overflow leading to outlet BOS-090.	Single 48" circular, metal top hinged tide gate. Appears to be slightly stuck open. (Approximately 2.0' of water in chamber.) 8/31/78
* Between Freeport St. and Southeast Expressway on 144" x 144" horseshoe-shaped reinforced concrete overflow conduit leading to outlet BOS-090.	Manhole inaccessible. 8/31/78

TABLE A-5

SUMMARY OF THE MDC TIDE GATE REHABILITATION PROGRAM[1]

FOR THE DORCHESTER BAY STUDY AREA

CSO OUTLET No.[2]	LOCATION[2]	NO. OF TIDE GATES	DESCRIPTION	CONTRACT NO.[3]	DATE COMPLETED
BOS-080	South Boston				
	E. First St. near Farragut Rd.	1	24" Metal		
	Farragut Rd. at E. First St.	1	60" x 72" Metal (upstream)	C-389H	3-74
		1	78" x 72" Wood (downstream) -removed		
BOS-081	South Boston				
	Farragut Rd. at Sixth St.	1	18" Metal	C-389D	10-72
BOS-082	South Boston				
	N St. at Marine Rd.	1	36" Metal (upstream)		10-71
	N St. at Day Boulevard	1	36" Metal (downstream)	C-389A	10-71
BOS-083	South Boston	1	36" Metal (upstream)		
	H St. at Marine Rd.	1	36" Metal (downstream)	C-389A	10-71
BOS-085	South Boston	1	60" x 60" Metal (upstream)		
	Rev. R.A. BurkeSt.	1	60" x 60" Metal (downstream)	C-389A	11-71
BOS-086	South Boston - Sterling Square	2	48" Metal (upstream)		8-72
		2	48" Metal (downstream)	C-389D	11-71
	Old Colony Ave. (South Structure)	2	36" Metal	C-389A	9-71
	Old Colony Ave. (North Structure)	2	48" x 48" Metal		9-71
BOS-087	South Boston				
	Crescent Ave. Structure	4	90" x 96" Wood	C-389	8-71
BOS-088	Dorchester	2	96" x 72" Wood (upstream)		
	Freeport Way - extended	2	28" Metal (downstream)	(No Improvements Required)	

TABLE A-3 (Cont.)

SUMMARY OF THE MDC TIDE GATE REHABILITATION PROGRAM[1]
FOR THE DORCHESTER BAY STUDY AREA

CSO OUTLET No.[2]	LOCATION[2]	NO. OF TIDE GATES	DESCRIPTION	CONTRACT NO.[3]	DATE COMPLETED
BOS-089	Dorchester - South of Savin Hill to Fox Point (Freeport St. Brook) Savin Hill Structure at Yacht Club	4	90" x 72" Wood	C-389	8-71
BOS-090	Dorchester Freeport St. at Victory Rd.	2	108" x 108" Wood	C-389C	8-72

(1) From Metropolitan District Commission, Tabulation of Tide Gates within the Boston Main Drainage System.

(2) Refer to Fig's B through D, appended for location of tide gates and outlets.

(3) Contracts within the Dorchester Bay Study Area.

DRY WEATHER FLOW MONITORING RESULTS

DWF-1 Dry Weather Flow Monitoring Location #1

Location: K Street @ Marine Road (S. Boston)

Gaging Period: 9/8/78 to 9/13/78

Type of Sewer: Combined

Characteristics of Sewer

Size: 24"

Shape: Circular

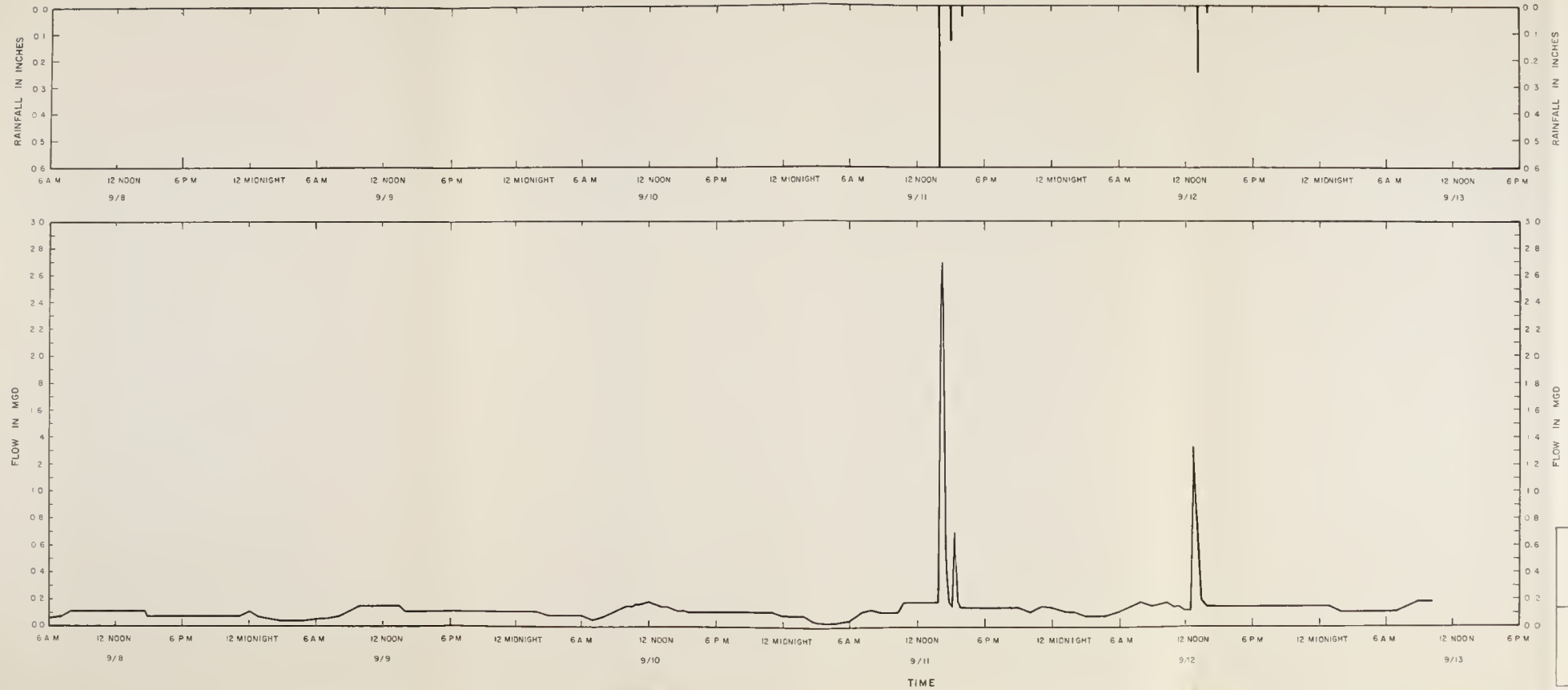
Construction Material: Brick

NOTE: Flows computed with a Manning's "n" value of 0.033 determined from a velocity test performed in the field.

GAGE NO. 1007 MANNING DIPPER K ST. AT MARINE - N = .033 ("N" Value determined with velocity test.)

TIME HRS	DATE 9/ 8/78 HEIGHT FT	DATE 9/ 8/78 FLOW MGD	DATE 9/ 9/78 HEIGHT FT	DATE 9/ 9/78 FLOW MGD	DATE 9/10/78 HEIGHT FT	DATE 9/10/78 FLOW MGD	DATE 9/11/78 HEIGHT FT	DATE 9/11/78 FLOW MGD	DATE 9/12/78 HEIGHT FT	DATE 9/12/78 FLOW MGD	DATE 9/13/78 HEIGHT FT	DATE 9/13/78 FLOW MGD
****											0.36	0.153
****					0.3	0.108						
0.			0.3	0.108			0.26	0.0826	0.34	0.137		
1.			0.24	0.0711					0.3	0.108	0.36	0.153
2.			0.2	0.0507					0.3	0.108	0.3	0.108MIN
3.			0.18	0.0416MIN	0.26	0.0826	0.18	0.0416	0.26	0.0826MIN	0.3	0.108MIN
4.			0.18	0.0416MIN			0.16	0.0332MIN	0.26	0.0826MIN	0.3	0.108MIN
5.			0.18	0.0416MIN			0.16	0.0332MIN	0.26	0.0826MIN	0.3	0.108MIN
6.	0.2	0.0507MIN	0.2	0.0507			0.2	0.0507	0.3	0.108	0.3	0.108MIN
7.	0.26	0.0826	0.2	0.0507	0.2	0.0507MIN	0.3	0.108	0.36	0.153	0.3	0.108MIN
8.	0.3	0.108MAX	0.24	0.0711	0.24	0.0711	0.32	0.122	0.4	0.186	0.36	0.153
9.	0.3	0.108MAX	0.3	0.108	0.3	0.108	0.3	0.108	0.36	0.153	0.4	0.186MAX
10.			0.36	0.153MAX	0.36	0.153	0.3	0.108	0.38	0.169	0.4	0.186MAX
10.5									0.4	0.186		
11.					0.38	0.169	0.4	0.186	0.36	0.153		
11.5							0.4	0.186	0.36	0.153		
12.					0.4	0.186MAX	0.4	0.186	0.32	0.122		
12.5									0.32	0.122		
12.75									1.1	1.31MAX		
13.			0.36	0.153MAX	0.36	0.153			0.8	0.702		
13.5									0.44	0.223		
14.	0.3	0.108MAX	0.3	0.108	0.32	0.122	0.4	0.186	0.36	0.153		
14.25							1.6	2.686MAX				
14.5							0.9	0.885	0.36	0.153		
14.75							0.6	0.401				
15.	0.24	0.0711			0.3	0.108	0.4	0.186	0.36	0.153		
15.25							0.36	0.153				
15.5							0.8	0.702	0.36	0.153		
15.75							0.4	0.186				
16.	0.24	0.0711					0.36	0.153	0.36	0.153		
17.	0.24	0.0711					0.36	0.153				
18.					0.3	0.108	0.36	0.153				
19.							0.36	0.153				
20.							0.36	0.153				
21.			0.3	0.108	0.3	0.108	0.34	0.137				
22.							0.3	0.108				
23.							0.36	0.153				
24.	0.3	0.108MAX			0.26	0.0826	0.34	0.137				

AVERAGE FLOW						
GPM	64.56	66.37	72.55	114.	115.8	97.85
MGD	0.0929	0.0955	0.104	0.164	0.166	0.14
CFS	0.143	0.147	0.161	0.254	0.257	0.218
TOTAL VOLUME						
MG	0.0697	0.0836	0.117	0.157	0.164	0.165
MAXIMUM FLOW						
GPM	75.28	106.2	129.6	1866.	910.3	129.6
MGD	0.108	0.153	0.186	2.686	1.311	0.186
CFS	0.167	0.236	0.288	4.156	2.028	0.288



COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION K STREET AT MARINE ROAD
(SEE FIG. V-1, DWF-1)

GAGING PERIOD 9/8 - 9/13

DWF-2 Dry Weather Flow Monitoring Location #2

Location: S. Boston Interceptor near Mt. Vernon Street (Dorchester)

Gaging Period: 10/6/78 to 10/12/78

Type of Sewer: Interceptor

Characteristics of Sewer

Size: 78"

Shape: Circular

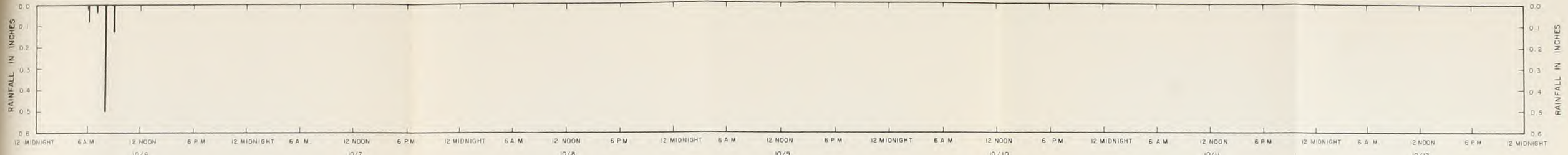
Construction Material: Reinforced Concrete

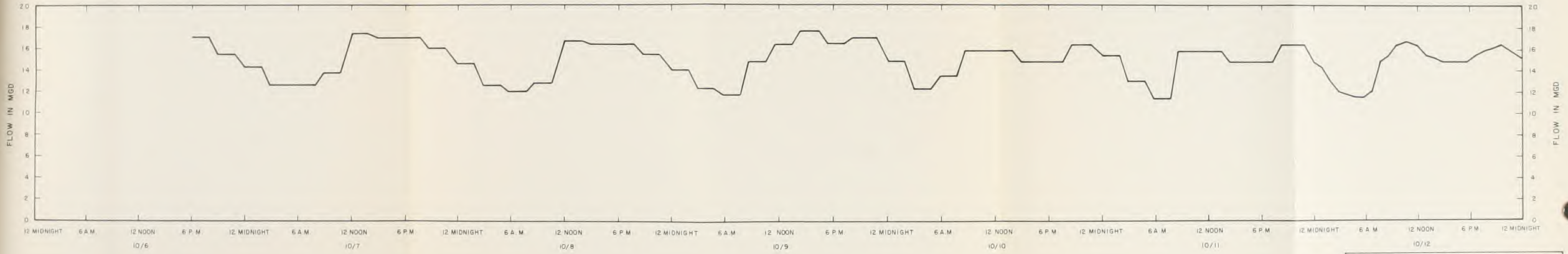
NOTE: Flows computed with a Manning's "n" value of 0.025 determined from a velocity test performed in the field.

("N" Value determined with velocity test)

GAGE NO. 2041 MANNING DIFFER - STORM INT - N = .025 '

DATE	10/ 6/78		10/ 7/78		10/ 8/78		10/ 9/78		10/10/78		10/11/78		10/12/78	
TIME HRS	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD
0.			1.87	5.556			1.77	4.99			1.85	5.441	2.45	9.41MAX
1.					1.83	5.327	1.75	4.88MIN						
2.					2.05	6.654	1.75	4.88MIN						
3.			2.45	9.41	2.25	7.984	1.85	5.441	1.69	4.556MIN	1.69	4.556MIN	1.69	4.556MIN
4.					2.45	9.41	2.05	6.654						
5.					2.55	10.15	2.25	7.984						
6.			2.55	10.15	2.59	10.46	2.41	9.117	2.15	7.306	2.09	6.912	1.85	5.441
7.					2.55	10.15	2.47	9.557						
8.					2.43	9.263	2.45	9.41						
9.			1.89	5.673	2.15	7.306	2.35	8.685	2.61	10.61MAX	2.67	11.07		
10.					1.89	5.673	2.05	6.654						
11.					1.93	5.908	1.87	5.556						
12.			2.21	7.71	1.95	6.027	1.95	6.027	2.15	7.306	2.55	10.15		
13.					1.97	6.151	1.95	6.027						
14.					2.25	7.984	1.95	6.027						
15.			2.61	10.61	2.45	9.41	2.15	7.306	2.05	6.654	2.09	6.912		
16.					2.49	9.706	2.41	9.117						
17.					2.65	10.92	2.49	9.706						
18.	2.75	11.71MAX	2.81	12.19MAX	2.77	11.86MAX	2.61	10.61	2.49	9.706	2.49	9.706		
19.					2.73	11.55	2.69	11.23MAX						
20.					2.61	10.61	2.65	10.92						
21.	2.03	6.526	2.11	7.342	2.45	9.41	2.57	10.3	2.61	10.61MAX	2.81	12.19MAX		
22.					1.89	5.673	2.35	8.685						
23.					1.81	5.214	1.85	5.441						
24.	1.87	5.556MIN	1.83	5.327MIN	1.77	4.99MIN	1.75	4.88MIN	1.85	5.441	2.45	9.41		
AVERAGE FLOW														
GPM		5264.		5924.		5817.		5358.		5675.		5984.		4161.
MGD		7.58		8.53		8.377		7.716		8.172		8.617		5.991
CFS		11.73		13.2		12.96		11.94		12.64		13.33		9.27
TOTAL VOLUME														
MG		1.895		8.53		8.029		7.716		7.15		8.617		1.498
MAXIMUM FLOW														
GPM		8132.		8466.		8243.		7803.		7371.		8466.		6535.
MGD		11.71		12.19		11.87		11.24		10.61		12.19		9.41
CFS		18.12		18.86		18.36		17.38		16.42		18.86		14.56
MINIMUM FLOW														
GPM		3859.		3700.		3466.		3389.		3164.		3164.		3164.
MGD		5.557		5.327		4.991		4.881		4.557		4.557		4.557
CFS		8.598		8.243		7.722		7.552		7.05		7.05		7.05





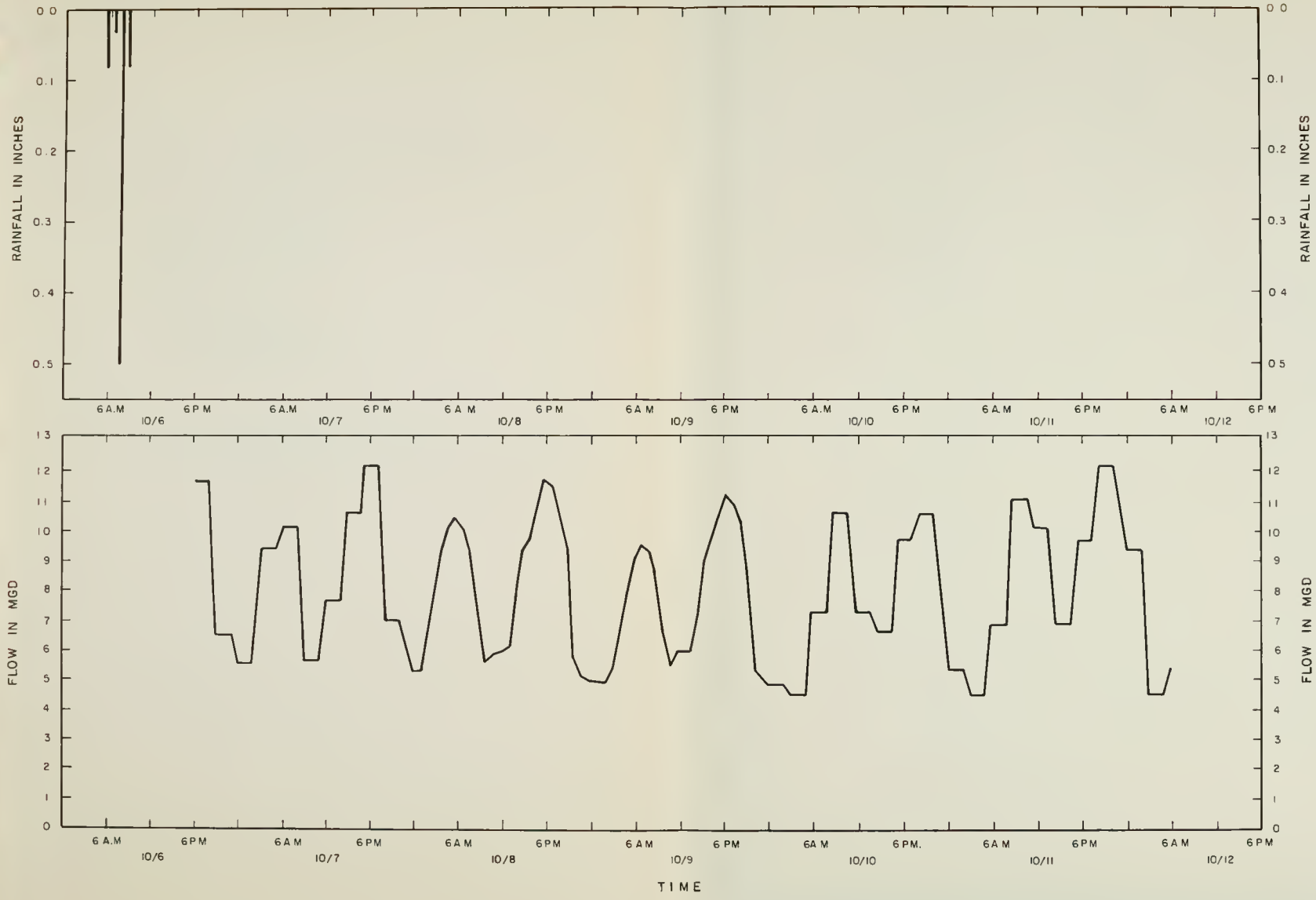
TIME

COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION: DORCHESTER INTERCEPTOR NEAR MORRISEY BLVD. (SEE FIG V-1, DWF-3)

GAGING PERIOD: 10/6 - 10/12



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION · S BOSTON INTERCEPTOR NEAR MT. VERNON STREET
(SEE FIG V-1, OWF-2)

GAGING PERIOD · 10/6 - 10/12

DWF-3 Dry Weather Flow Monitoring Location #3

Location: Dorchester Interceptor near Morrisey Boulevard (Dorchester)

Gaging Period: 10/6/78 to 10/12/78

Type of Sewer: Interceptor

Characteristics of Sewer

Size: 60"

Shape: Circular

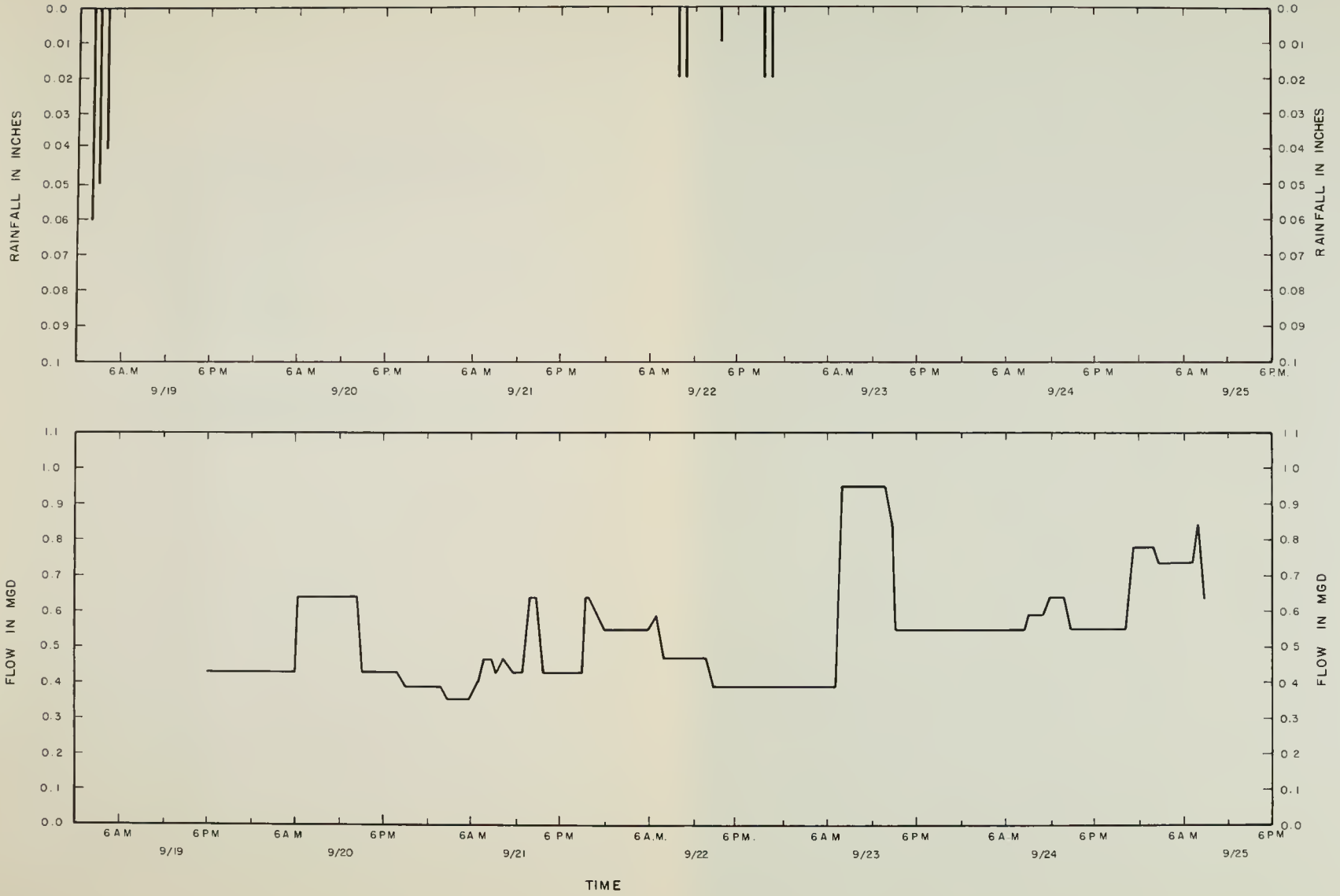
Construction Material: Brick

NOTE: Flows computed with a Manning's "n" value of 0.0079 determined from a velocity test performed in the field.

("N" Value determined with velocity test)

GAGE NO. 2[illegible]2 MANNING DIPPER -DORCH INT - N = .0[illegible]79 !

DATE *	1 / 6/78		10/ 7/78		10/ 8/78		10/ 9/78		10/10/78		10/11/78		10/12/78	
TIME HRS	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD
0.	*		* 1.87	14.28	*		*		*		*		*	
1.	*		*		*		*		*		*		* 1.87	14.28
2.	*		*		*		*		*		*		* 1.77	12.84
3.	*		* 1.75	12.56MIN	* 1.75	12.56	* 1.73	12.28	* 1.73	12.28	* 1.71	12.01	* 1.71	12.01
4.	*		*		*		*		*		*		* 1.69	11.74
5.	*		*		*		*		*		*		* 1.67	11.47MIN
6.	*		* 1.75	12.56MIN	* 1.71	12.01MIN	* 1.69	11.74MIN	* 1.67	11.47MIN	* 1.67	11.47MIN	* 1.67	11.47MIN
7.	*		*		*		*		*		*		* 1.71	12.01
8.	*		*		*		*		*		*		* 1.91	14.87
9.	*		* 1.83	13.69	* 1.77	12.84	* 1.77	12.84	* 1.97	15.77	* 1.97	15.77	* 1.95	15.46
10.	*		*		*		*		*		*		* 2.01	16.38
11.	*		*		*		*		*		*		* 2.03	16.69MAX
12.	*		* 2.07	17.31MAX	* 2.03	16.69MAX	* 2.01	16.38	* 1.97	15.77	* 1.97	15.77	* 2.01	16.38
13.	*		*		*		*		*		*		* 1.95	15.46
14.	*		*		*		*		*		*		* 1.93	15.16
15.	*		* 2.05	17.	* 2.01	16.38	* 2.09	17.63MAX	* 1.91	14.87	* 1.91	14.87	* 1.91	14.87
16.	*		*		*		*		*		*		* 1.91	14.87
17.	*		*		*		*		*		*		* 1.91	14.87
18.	* 2.05	17.MAX	* 2.05	17.	* 2.01	16.38	* 2.01	16.38	* 1.91	14.87	* 1.91	14.87	* 1.91	14.87
19.	*		*		*		*		*		*		* 1.95	15.46
20.	*		*		*		*		*		*		* 1.97	15.77
21.	* 1.95	15.46	* 1.99	16.07	* 1.95	15.46	* 2.05	17.	* 2.01	16.38MAX	* 2.01	16.38MAX	* 1.99	16.07
22.	*		*		*		*		*		*		* 2.01	16.38
23.	*		*		*		*		*		*		* 1.97	15.77
24.	* 1.87	14.28MIN	* 1.89	14.57	* 1.85	13.98	* 1.91	14.87	* 1.89	14.57	* 1.91	14.87	* 1.93	15.16
AVERAGE FLOW														
GPM		10800.		10470.		10220.		10470.		10180.		10180.		10130.
MGD		15.56		15.08		14.72		15.08		14.65		14.65		14.59
CFS		24.07		23.34		22.78		23.33		22.67		22.67		22.58
TOTAL VOLUME														
MG		3.889		15.08		12.88		13.2		12.82		12.82		13.99
MAXIMUM FLOW														
GPM		11810.		12030.		11590.		12250.		11380.		11380.		11590.
MGD		17.01		17.32		16.69		17.63		16.38		16.38		16.69
CFS		26.31		26.8		25.83		27.28		25.35		25.35		25.83
MINIMUM FLOW														
GPM		9915.		8725.		8342.		8153.		7965.		7965.		7965.
MGD		14.28		12.56		12.01		11.74		11.47		11.47		11.47
CFS		22.09		19.44		18.59		18.16		17.75		17.75		17.75



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION: BAY STREET NEAR MARYLAND STREET
(SEE FIG. V-2, DWF-4)

GAGING PERIOD: 9/19 - 9/25

DWF-4 Dry Weather Flow Monitoring Location #4

Location: Bay Street @ Maryland Street (Dorchester)

Gaging Period: 9/19/78 to 9/25/78

Type of Sewer: Combined

Characteristics of Sewer

Size: 28" x 42"

Shape: Egg-Shaped

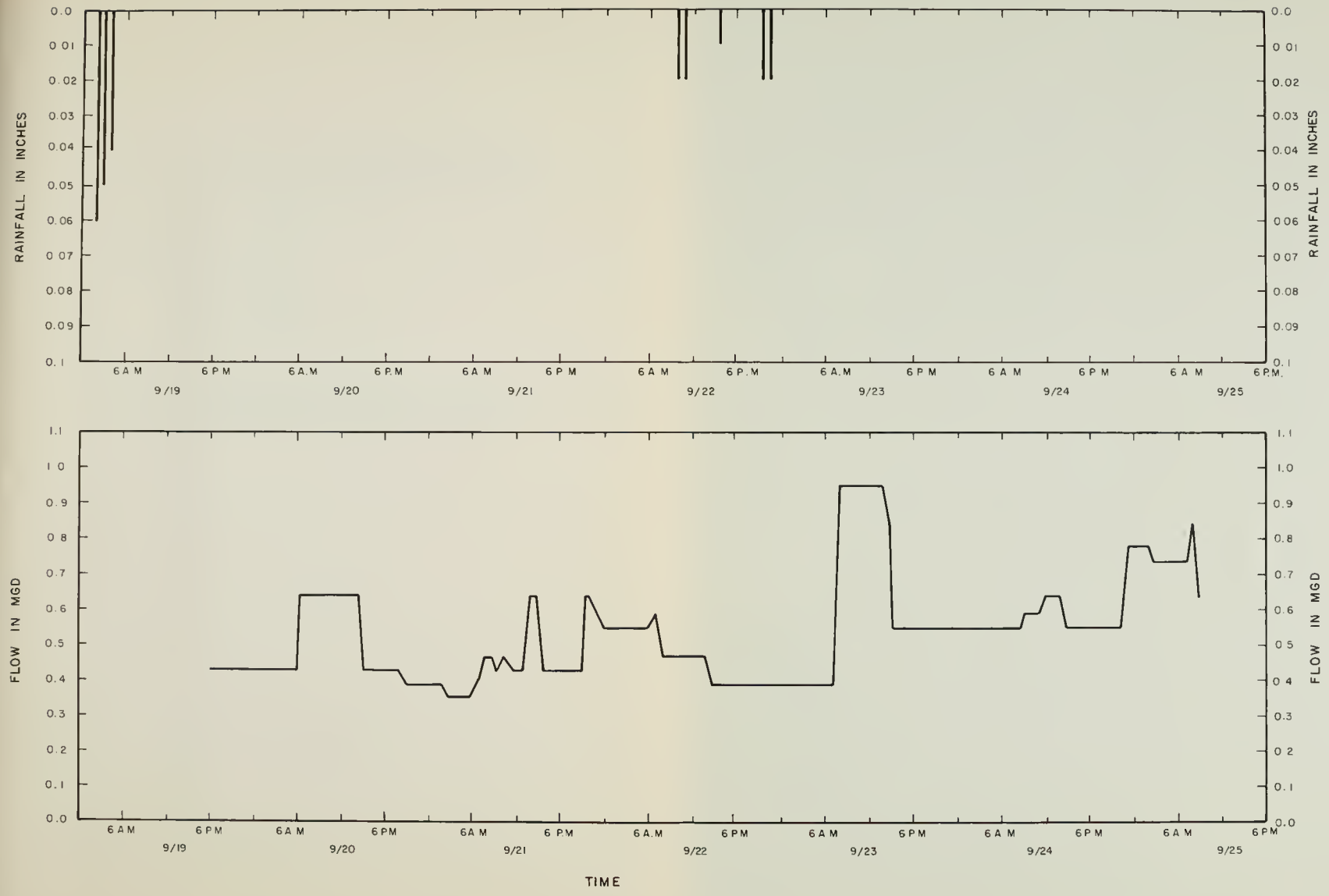
Construction Material: Brick

NOTE: Flows computed with a Manning's "n" value of 0.015 determined from a velocity test performed in the field.

GAGE NO. 1006 MANNING DIPPER BAY ST. NEAR MARYLAND N = .015 ! ("N" Value determined with velocity test)

TIME HRS	9/19/78 HEIGHT FT	9/19/78 FLOW MGD	9/20/78 HEIGHT FT	9/20/78 FLOW MGD	9/21/78 HEIGHT FT	9/21/78 FLOW MGD	9/22/78 HEIGHT FT	9/22/78 FLOW MGD	9/23/78 HEIGHT FT	9/23/78 FLOW MGD	9/24/78 HEIGHT FT	9/24/78 FLOW MGD	9/25/78 HEIGHT FT	9/25/78 FLOW MGD
0.			0.42	0.428	0.4	0.391	0.48	0.55	0.4	0.391MIN	0.48	0.55MIN	0.56	0.737
1.							0.48	0.55						
2.							0.48	0.55						
3.			0.42	0.428	0.38	0.355MIN	0.48	0.55	0.4	0.391MIN	0.48	0.55MIN	0.56	0.736
4.							0.48	0.55						
5.							0.48	0.55						
6.			0.42	0.428	0.38	0.355MIN	0.48	0.55	0.4	0.391MIN	0.48	0.55MIN	0.56	0.736
6.25			0.52	0.64MAX										
7.					0.4	0.391	0.5	0.594MAX						
8.					0.44	0.467	0.44	0.467	0.64	0.949MAX			0.6	0.839MAX
8.5													0.52	0.64MAX
9.					0.44	0.467	0.44	0.467			0.5	0.594		
9.25			0.52	0.64MAX										
10.					0.42	0.428			0.64	0.949MAX				
11.					0.44	0.467								
12.					0.42	0.428	0.44	0.467	0.64	0.949MAX	0.52	0.64		
12.25			0.52	0.64MAX										
13.					0.42	0.428								
13.5					0.52	0.64MAX								
14.					0.52	0.64MAX								
15.					0.52	0.64MAX	0.4	0.391MIN	0.6	0.839	0.48	0.55MIN		
15.25			0.52	0.64MAX										
15.5			0.42	0.428	0.44	0.467			0.48	0.55				
16.					0.44	0.467								
17.					0.44	0.467								
18.	0.42	0.428MIN	0.42	0.428	0.44	0.467	0.4	0.391MIN	0.48	0.55	0.48	0.55MIN		
19.					0.44	0.467								
20.					0.44	0.467								
21.	0.42	0.428MIN	0.4	0.391MIN	0.44	0.467	0.4	0.391MIN	0.48	0.55	0.48	0.55MIN		
21.5					0.52	0.64MAX								
22.					0.52	0.64MAX								
23.					0.5	0.594					0.58	0.787MAX		
24.	0.42	0.428MIN	0.4	0.391MIN	0.48	0.55	0.4	0.391MIN	0.48	0.55	0.58	0.787MAX		

AVERAGE FLOW						
GPM	297.6	349.4	321.	320.8	439.8	407.5	526.3
MGD	0.428	0.503	0.462	0.461	0.633	0.586	0.757
CFS	0.663	0.778	0.715	0.714	0.979	0.908	1.173
TOTAL VOLUME							
MG	0.107	0.503	0.462	0.461	0.633	0.586	0.268
MAXIMUM FLOW							
GPM	297.6	444.5	444.5	412.8	659.5	546.8	583.2
MGD	0.428	0.64	0.64	0.594	0.949	0.787	0.839
CFS	0.663	0.99	0.99	0.919	1.469	1.218	1.299
MINIMUM FLOW							
GPM	297.6	271.8	247.1	271.8	271.8	382.2	444.5
MGD	0.428	0.391	0.355	0.391	0.391	0.55	.64
CFS	0.663	0.605	0.55	0.605	0.605	0.851	.99



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION: BAY STREET NEAR MARYLAND STREET
(SEE FIG V-2, DWF-4)

GAGING PERIOD: 9/19 – 9/25

DWF-5 Dry Weather Flow Monitoring Location #5

Location: Geneva Avenue @ Tonawanda Street (Dorchester)

Gaging Period: 9/15/78 to 9/19/78

Type of Sewer: Combined

Characteristics of Sewer

Size: 27" x 35"

Shape: Egg-Shaped

Construction Material: Brick

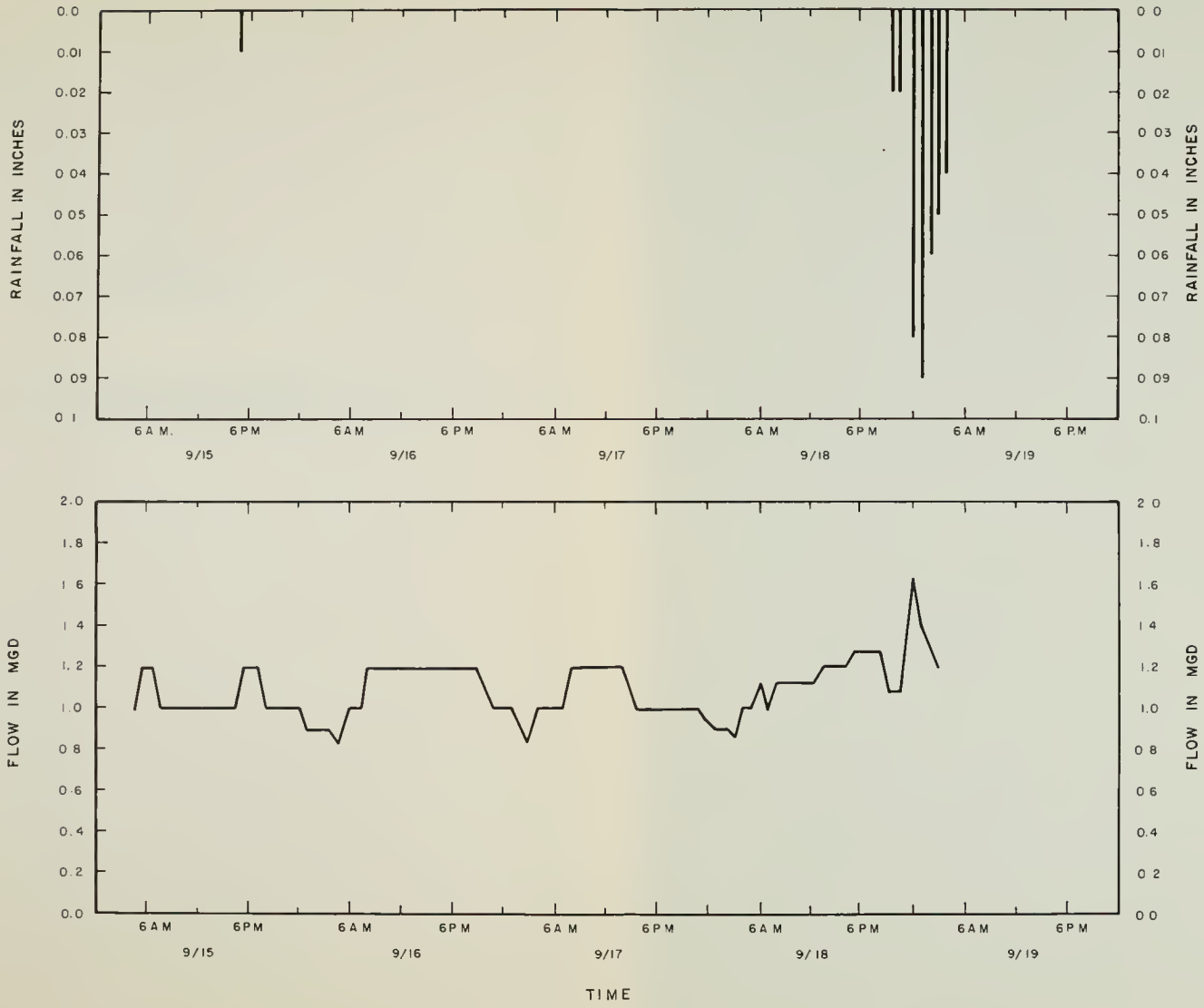
NOTE: Flows computed with a Manning's "n" value of 0.015 determined from a velocity test performed in the field.

("N" Value determined with velocity test)

GAGE NO. 1004 BRISTOL GAGE GENEVA AVE. NEAR TONAWANDA - GENEVA AVE. AT TONAWANDA - N = .015

DATE	9/15/78		9/16/78		9/17/78		9/18/78		9/19/78			
TIME HRS	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD
0.			0.91	1.012	0.91	1.012	0.88	0.939	1.16	1.634MAX		
1.			0.86	0.904	0.91	1.012	0.86	0.904	1.08	1.412		
2.			0.86	0.904	0.88	0.939	0.86	0.904	1.05	1.327		
3.			0.86	0.904	0.83	0.837MIN	0.85	0.87MIN	1.	1.204MIN		
4.			0.86	0.904	0.91	1.012	0.91	1.012				
5.	0.91	1.012MIN	0.83	0.837MIN	0.91	1.012	0.91	1.012				
6.	1.	1.204MAX	0.91	1.012	0.91	1.012	0.96	1.125				
7.	1.	1.204MAX	0.91	1.012	0.91	1.012	0.91	1.012				
8.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	0.96	1.125				
9.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	0.96	1.125				
10.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	0.96	1.125				
11.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	0.96	1.125				
12.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	0.96	1.125				
13.	0.91	1.012MIN	1.	1.204MAX	1.	1.204MAX	1.	1.204				
14.	0.91	1.012MIN	1.	1.204MAX	0.96	1.125	1.	1.204				
15.	0.91	1.012MIN	1.	1.204MAX	0.91	1.012	1.	1.204				
16.	0.91	1.012MIN	1.	1.204MAX	0.91	1.012	1.	1.204				
17.	0.91	1.012MIN	1.	1.204MAX	0.91	1.012	1.03	1.236				
18.	1.	1.204MAX	1.	1.204MAX	0.91	1.012	1.03	1.286				
19.	1.	1.204MAX	1.	1.204MAX	0.91	1.012	1.03	1.286				
20.	0.91	1.012MIN	1.	1.204MAX	0.91	1.012	1.03	1.286				
21.	0.91	1.012MIN	1.	1.204MAX	0.91	1.012	1.	1.204				
22.	0.91	1.012MIN	0.95	1.087	0.91	1.012	0.95	1.087				
23.	0.91	1.012MIN	0.91	1.012	0.91	1.012	0.95	1.087				
24.	0.91	1.012MIN	0.91	1.012	0.88	0.939	1.16	1.634MAX				

AVERAGE FLOW					
GPM	731.	765.5	731.4	784.1	962.9
MGD	1.053	1.102	1.053	1.129	1.387
CFS	1.629	1.706	1.63	1.747	2.145
TOTAL VOLUME					
MG	0.833	1.102	1.053	1.129	0.173
MAXIMUM FLOW					
GPM	836.6	836.6	836.6	1135.	1135.
MGD	1.205	1.205	1.205	1.635	1.635
CFS	1.864	1.864	1.864	2.529	2.529
MINIMUM FLOW					
GPM	702.9	581.5	581.5	604.6	836.6
MGD	1.012	0.837	0.837	0.87	1.205
CFS	1.566	1.296	1.296	1.347	1.864



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION: GENEVA AVENUE AT TONAWANDA STREET
(SEE FIG V-2, DWF-5)

GAGING PERIOD: 9/15 - 9/19

DWF-6 Dry Weather Flow Monitoring Location #6

Location: Gibson Street @ Dorchester Avenue (Dorchester)

Gaging Period: 10/10/78 to 10/12/78

Type of Sewer: Combined

Characteristics of Sewer

Size: 32" x 42"

Shape: Egg-Shaped

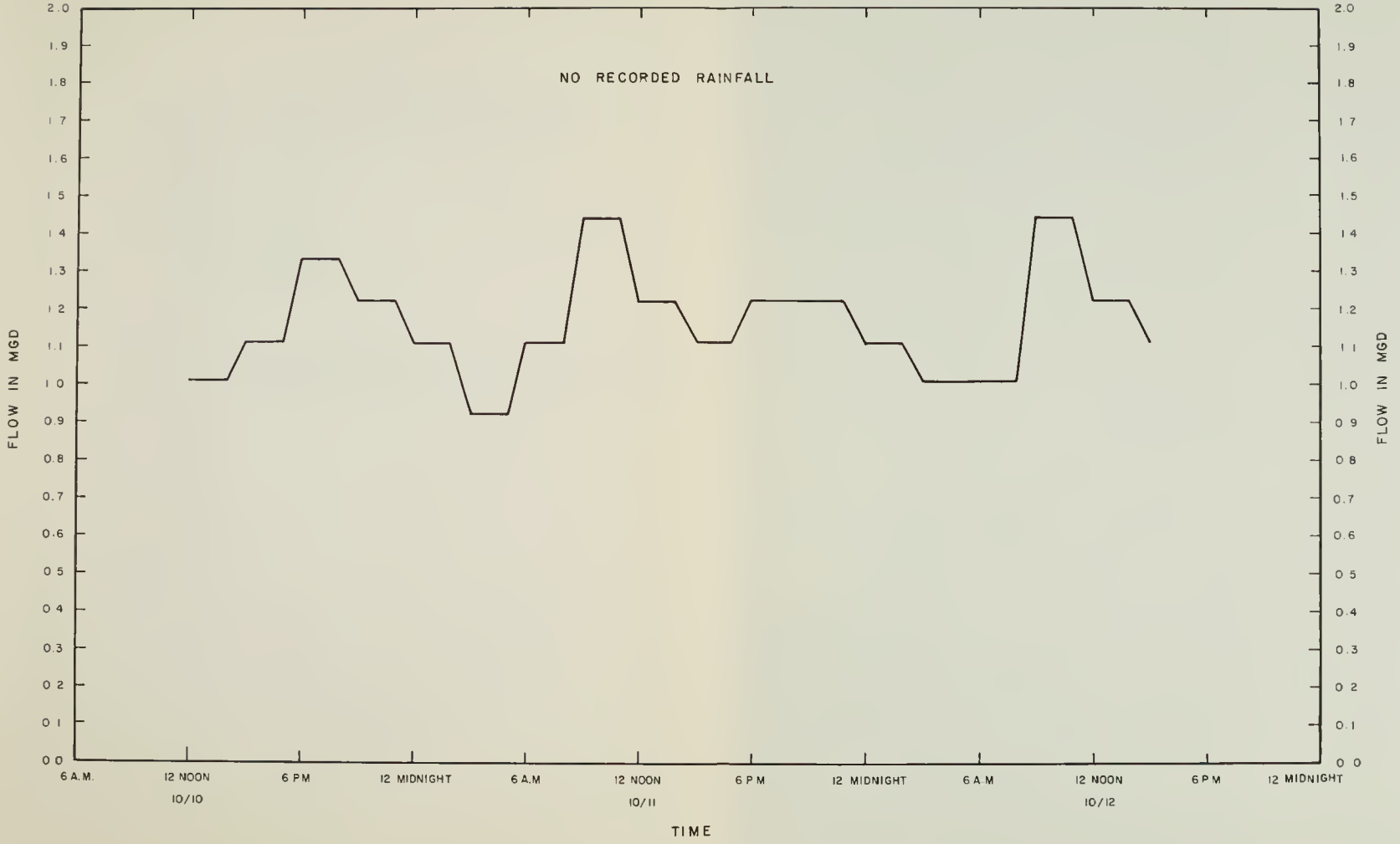
Construction Material: Brick

NOTE: Flows computed with a Manning's "n" value of 0.010 determined from a velocity test performed in the field.

GAGE NO. 1099 MANNING DIPPER GIBSON ST. - DWF - GIBSON ST. - N = .010 ("N" Value determined with velocity test)

DATE	10/10/78		10/11/78		10/12/78							
TIME HRS	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD
0.			0.44	1.114	0.44	1.114						
3.			0.4	0.919MIN	0.42	1.014MIN						
6.			0.42	1.014	0.42	1.014MIN						
9.			0.5	1.44MAX	0.5	1.44MAX						
12.	0.42	1.014MIN	0.46	1.218	0.46	1.218						
15.	0.44	1.114	0.44	1.114	0.44	1.114						
18.	0.48	1.327MAX	0.46	1.218								
21.	0.46	1.218	0.46	1.218								
24.	0.44	1.114	0.44	1.114								

AVERAGE FLOW			
GPM	820.4	803.8	806.
MGD	1.181	1.157	1.161
CFS	1.828	1.791	1.796
TOTAL VOLUME			
MG	0.59	1.157	0.725
MAXIMUM FLOW			
GPM	921.8	1000.	1000.
MGD	1.327	1.44	1.44
CFS	2.054	2.228	2.228
MINIMUM FLOW			
GPM	704.6	638.3	704.6
MGD	1.015	0.919	1.015
CFS	1.57	1.422	1.57



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION GIBSON STREET NEAR DORCHESTER AVENUE
(SEE FIG. V-2, DWF-6)

GAGING PERIOD 10/10 - 10/12

DWF-7 Dry Weather Flow Monitoring Location #7

Location: Victory Road @ Neponset Avenue (Dorchester)

Gaging Period: 9/25/78 to 10/1/78

Type of Sewer: Combined

Characteristics of Sewer

Size: 40" x 60"

Shape: Egg-Shaped

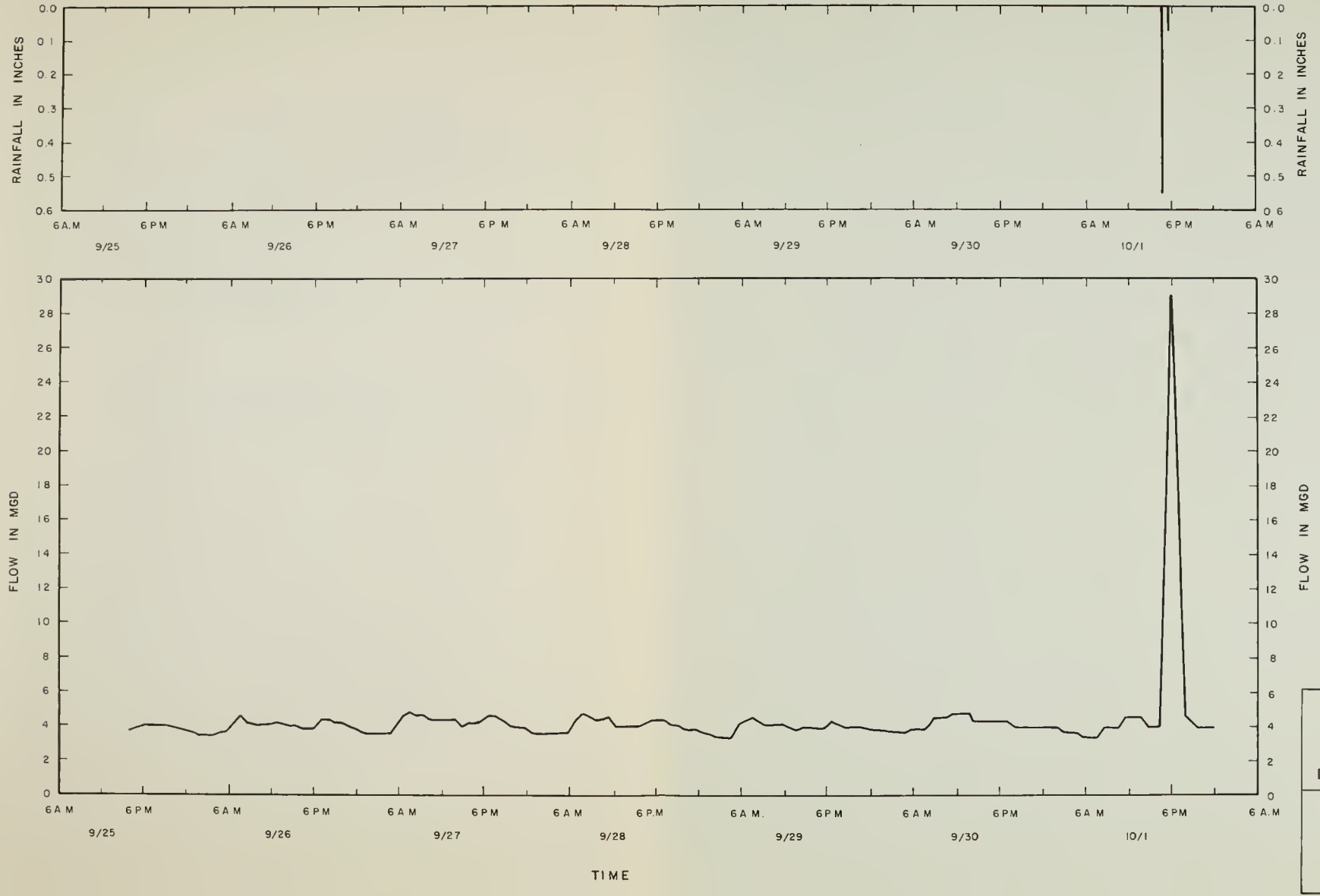
Construction Material: Brick

NOTE: Flows computed with a Manning's "n" value of 0.014 determined from a velocity test performed in the field.

("N" Value determined with velocity test)

GAGE NO. 10.3 "MANNING DIPLER VICTORY RD. NEAR NEWPORT - VICTORY AT TRAIN (SAMPLING) - N = .014 !

DATE	9/25/78		9/26/78		9/27/78		9/28/78		9/29/78		9/30/78		10/ 1/78	
TIME HRS	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD	*HEIGHT *FT	FLOW MGD
0.*			*		*		*		*		* 0.88	3.885	* 0.9	4.053
1.*			* 0.84	3.558	* 0.86	3.72	* 0.86	3.72	* 0.86	3.72	*		*	
2.*			* 0.82	3.399MIN	* 0.84	3.558MIN	* 0.84	3.558MIN	* 0.84	3.558	*		*	
3.*			* 0.82	3.399MIN	* 0.84	3.558MIN	* 0.84	3.558MIN	* 0.82	3.399MIN	* 0.86	3.72MIN	* 0.86	3.72
4.*			* 0.82	3.399MIN	* 0.84	3.558MIN	* 0.84	3.558MIN	* 0.82	3.399MIN	*		*	
5.*			* 0.84	3.558	* 0.84	3.558MIN	* 0.84	3.558MIN	* 0.82	3.399MIN	*		*	
6.*			* 0.86	3.72	* 0.9	4.053	* 0.86	3.72	* 0.92	4.224	* 0.88	3.885	* 0.84	3.558MIN
7.*			* 0.92	4.224	* 0.96	4.577	* 0.94	4.399	* 0.94	4.399	*		*	
8.*			* 0.96	4.577MAX	* 0.98	4.758MAX	* 0.98	4.758MAX	* 0.96	4.577MAX	*		*	
9.*			* 0.92	4.224	* 0.96	4.577	* 0.96	4.577	* 0.94	4.399	* 0.96	4.577	* 0.9	4.053
10.*			* 0.9	4.053	* 0.96	4.577	* 0.94	4.399	* 0.92	4.224	*		*	
11.*			* 0.9	4.053	* 0.94	4.399	* 0.94	4.399	* 0.92	4.224	*		*	
12.*			* 0.92	4.224	* 0.94	4.399	* 0.96	4.577	* 0.92	4.224	* 0.98	4.758MAX	* 0.96	4.577
13.*			* 0.92	4.224	* 0.94	4.399	* 0.9	4.053	* 0.9	4.053	*		*	
14.*			* 0.9	4.053	* 0.94	4.399	* 0.9	4.053	* 0.88	3.885	*		*	
15.*			* 0.9	4.053	* 0.9	4.053	* 0.9	4.053	* 0.9	4.053	* 0.94	4.399	* 0.92	4.224
16.*	0.86	3.72MIN	* 0.88	3.885	* 0.92	4.224	* 0.9	4.053	* 0.9	4.053	*		* 0.9	4.053
17.*	0.88	3.885	* 0.88	3.885	* 0.92	4.224	* 0.92	4.224	* 0.9	4.053	*		* 0.9	4.053
18.*	0.9	4.053MAX	* 0.9	4.053	* 0.94	4.399	* 0.94	4.399	* 0.9	4.053	* 0.94	4.399	* 2.5	29.02MAX
19.*	0.9	4.053MAX	* 0.94	4.399	* 0.96	4.577	* 0.94	4.399	* 0.94	4.399	*		* 1.68	13.43
20.*	0.9	4.053MAX	* 0.94	4.399	* 0.96	4.577	* 0.94	4.399	* 0.92	4.224	*		* 0.96	4.577
21.*	0.9	4.053MAX	* 0.92	4.224	* 0.94	4.399	* 0.92	4.224	* 0.9	4.053	* 0.9	4.053	* 0.9	4.053
22.*	0.9	4.053MAX	* 0.92	4.224	* 0.92	4.224	* 0.92	4.224	* 0.9	4.053	*		*	
23.*	0.88	3.885	* 0.9	4.053	* 0.9	4.053	* 0.88	3.885	* 0.9	4.053	*		*	
24.*	0.86	3.72MIN	* 0.88	3.885	* 0.88	3.885	* 0.88	3.885	* 0.88	3.885	* 0.9	4.053	* 0.9	4.053
AVERAGE FLOW														
GPM		2757.		2778.		2926.		2864.		2801.		2931.		3808.
MGD		3.97		4.001		4.214		4.123		4.034		4.22		5.483
CFS		6.142		6.19		6.519		6.38		6.241		6.53		8.483
TOTAL VOLUME														
MG		1.323		3.834		4.038		3.952		3.866		4.22		5.483
MAXIMUM FLOW														
GPM		2815.		3179.		3304.		3304.		3179.		3304.		20150.
MGD		4.053		4.577		4.758		4.758		4.577		4.758		29.02
CFS		6.272		7.082		7.362		7.362		7.082		7.362		44.9
MINIMUM FLOW														
GPM		2583.		2361.		2471.		2471.		2361.		2583.		2471.
MGD		3.72		3.4		3.558		3.558		3.4		3.72		3.558
CFS		5.756		5.26		5.506		5.506		5.26		5.756		5.506



COMMONWEALTH OF MASSACHUSETTS

METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION: VICTORY ROAD NEAR NEPONSET STREET
(SEE FIG V-2, DWF-7)

GAGING PERIOD: 9/25 - 10/1

DWF-8 Dry Weather Flow Monitoring Location #8

Location: Dorchester Interceptor @ McKone Street (Dorchester)

Gaging Period: 10/18/78 to 10/24/78

Type of Sewer: Interceptor

Characteristics of Sewer

Size: 54"

Shape: Circular

Construction Material: Brick

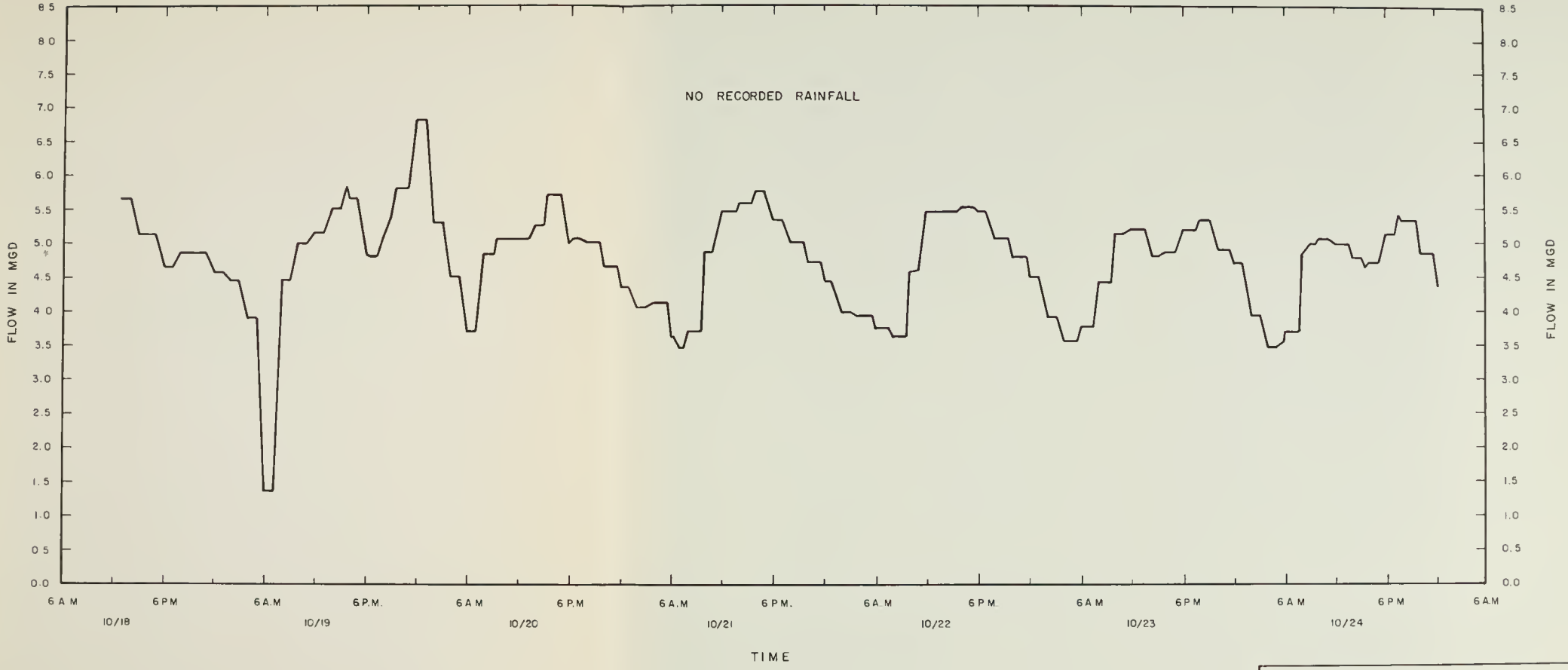
NOTE: Flows computed with a Manning's "n" value of 0.026 determined from a velocity test performed in the field.

("N" Value determined with velocity test)

GAGE NO. 2004 MANNING DIPPER - DURCH INT @ MCKONE WITH SED DEPTH = 1.0 FT, N = .026

DATE	10/18/78		10/19/78		10/20/78		10/21/78		10/22/78		10/23/78		10/24/78	
TIME HRS	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD	*HEIGHT FT	FLOW MGD
0.			3.34	4.574	4.32	6.825MAX	3.28	4.359	3.3	4.431	3.3	4.431	3.38	4.715
2.			3.3	4.431	3.56	5.321	3.2	4.067	3.18	3.994	3.16	3.92	3.16	3.92
4.			3.16	3.92	3.32	4.502	3.22	4.141	3.16	3.92	3.06	3.549MIN	3.04	3.474MIN
5.5													3.06	3.549
6.			2.44	1.339MIN	3.1	3.698MIN	3.08	3.623	3.12	3.772	3.12	3.772	3.1	3.698
6.5					3.1	3.698MIN								
7.							3.04	3.474MIN						
7.25									3.06	3.549MIN				
8.			3.3	4.431	3.34	4.574	3.1	3.698	3.08	3.623	3.3	4.431	3.4	4.784
9.													3.46	4.991
9.25					3.48	5.058								
10.			3.46	4.991	3.48	5.058	3.42	4.854	3.34	4.574	3.5	5.125	3.48	5.058
12.			3.5	5.125	3.48	5.058	3.6	5.449	3.6	5.449	3.52	5.191	3.46	4.991
13.5					3.5	5.125								
14.	3.66	5.633MAX	3.52	5.511	3.54	5.257	3.64	5.573	3.6	5.449	3.46	4.991	3.4	4.784
14.75											3.4	4.784		
15.5			3.7	5.752	3.68	5.693							3.36	4.644
16.	3.5	5.125	3.56	5.633	3.68	5.693	3.7	5.752MAX	3.62	5.511MAX	3.42	4.854	3.38	4.715
16.75					3.68	5.693								
18.	3.36	4.644	3.42	4.854	3.46	4.991	3.56	5.321	3.6	5.449	3.52	5.191	3.5	5.125
18.25					3.48	5.058								
18.5			3.4	4.784										
19.5											3.56	5.321MAX	3.58	5.385MAX
20.	3.42	4.854	3.48	5.058	3.46	4.991	3.46	4.991	3.48	5.058	3.52	5.191	3.56	5.321
21.5			3.52	5.191										
22.			3.58	5.385	3.36	4.644	3.38	4.715	3.4	4.784	3.44	4.922	3.42	4.854
22.5			3.7	5.752										
23.5			4.46	6.651										
24.	3.34	4.574MIN	4.32	6.825MAX	3.28	4.359	3.3	4.431	3.3	4.431	3.38	4.715	3.3	4.431

AVERAGE FLOW							
GPM	3395.	3265.	3446.	3269.	3238.	3224.	3200.
MGD	4.888	4.701	4.962	4.707	4.663	4.642	4.609
CFS	7.564	7.274	7.677	7.284	7.214	7.182	7.131
TOTAL VOLUME							
MG	2.037	4.701	4.962	4.707	4.663	4.642	4.609
MAXIMUM FLOW							
GPM	3912.	4740.	4740.	3995.	3827.	3696.	3740.
MGD	5.634	6.825	6.825	5.752	5.512	5.322	5.386
CFS	8.717	10.56	10.56	8.9	8.528	8.234	8.333
MINIMUM FLOW							
GPM	3176.	929.9	2568.	2413.	2465.	2465.	2413.
MGD	4.574	1.339	3.698	3.475	3.549	3.549	3.475
CFS	7.077	2.072	5.722	5.376	5.492	5.492	5.376



COMMONWEALTH OF MASSACHUSETTS
METROPOLITAN DISTRICT COMMISSION

COMBINED SEWER OVERFLOW PROJECT
DORCHESTER BAY AREA FACILITIES PLAN

DRY WEATHER FLOW MONITORING DATA

GAGE LOCATION · DORCHESTER INTERCEPTOR AT McKONE STREET (SEE FIG. V-3, DWF-8)

GAGING PERIOD · 10/18 - 10/24

APPENDIX A

TRANSPORT CONDUIT (LINK) AND JUNCTION (NODE) DATA

JUNCTION DATA FOR TRANSPORT BLOCK - SOUTH BOSTON[1]

JUNCTION	GROUND SURFACE ELEVATION (ft)	INVERT ELEVATION (ft)	DRY WEATHER FLOW(2) (cfs)
501	25.0	12.2	
502	25.0	12.2	
503	25.0	12.2	
504	25.0	12.2	
505	34.2	14.0	
601	25.0	12.0	
602	25.0	12.0	
603	25.0	12.0	
604	25.0	12.0	
605	34.2	13.5	
60101	16.0	-14.4	
60201	19.0	-15.9	
60202	19.0	-15.9	
60203	19.0	-15.9	
60204	19.0	-15.9	
60501	19.0	-17.0	
60502	19.0	-17.0	
60503	19.0	-17.0	
60504	19.0	-17.0	
80101	21.0	11.04	
80102	22.8	12.0	
80201	21.0	7.6	
80202	22.7	7.6	
80301	20.0	8.6	
80302	22.9	8.5	
80501	17.0	3.6	
81101	20.2	9.7	
81201	16.9	4.8	
81301	16.9	5.7	
81501	13.3	4.6	
82101	22.2	12.0	
82201	16.4	.32	
82301	16.6	3.05	
82401	25.0	2.12	
82501	10.0	-7.5	
83101	32.4	22.8	
83201	26.2	-.75	
83301	26.2	14.5	
83501	17.4	5.4	
84101	38.7	26.4	
84201	17.2	-1.36	
84301	17.2	1.2	
84303	19.5	-2.8	

(1) See Figure VII-17A.

(2) Represents dry weather flows input at nodes only; other dry weather flows contained in conduit data for RUNOFF block (Table VII-7A).

JUNCTION DATA FOR TRANSPORT BLOCK - SOUTH BOSTON

- Continued -

JUNCTION	GROUND SURFACE ELEVATION (ft)	INVERT ELEVATION (ft)	DRY WEATHER FLOW (cfs)
84501	16.4	2.6	
85101	18.6	3.9	
85201	16.7	-4.42	
85301	16.7	2.1	
85501	14.0	2.3	
86106	16.3	5.4	
86107	20.0	1.2	
86199	24.7	-10.8	
86205	17.6	3.5	
86208	17.0	.14	
86210	17.2	-13.1	
86212	16.0	-14.2	
86213	20.2	.45	
86222	17.2	-11.9	
86305	17.2	3.6	
86306	20.2	-7.5	
86310	17.2	-12.9	
86404	16.0	-8.2	.203
86405	10.0	-13.4	.721
86502	19.0	-.09	
86506	10.0	-14.2	.089
86555	18.5	-7.17	
87555	17.2	-12.2	

TRANSPORT CONDUIT DATA - SOUTH BOSTON[1]

CONDUIT NUMBER	JUNCTIONS AT ENDS		TYPE[2]	AREA (sq ft)	DEPTH (ft)	WIDTH (ft)	LENGTH (ft)	ZUP[3]	ZDOWN[4]	MANNING'S N
1	80301	80202	1	1.23	1.25	1.25	200.			.014
2	80302	80202	1	0.79	1.	1.	200.			.0133
3	81301	81201	1	0.79	1.	1.	200.			.0133
4	82301	82201	1	0.79	1.	1.	200.		.68	.0133
5	83301	83201	1	0.79	1.	1.	200.		3.75	.0133
6	84301	84201	1	0.79	1.	1.	200.		.96	.0133
7	85301	85201	1	1.23	1.25	1.25	200.		.98	.014
20	86305	86205	1	1.23	1.25	1.25	200.		0.6	.014
61	60201	60501	1	9.62	3.5	3.5	200.			.02
62	60202	60502	1	9.62	3.5	3.5	200.			.02
63	60203	60503	1	9.62	3.5	3.5	200.			.02
64	60204	60504	1	9.62	3.5	3.5	200.			.02
401	501	601	2	100.	10.	10.	200.			.017
402	502	602	2	100.	10.	10.	200.			.017
403	503	603	2	100.	10.	10.	200.			.017
404	504	604	2	100.	10.	10.	200.			.017
405	505	605	2	100.	10.	10.	200.			.017
6001	60101	60201	2	25.	5.	5.	200.			.05
6002	60101	60202	2	25.	5.	5.	200.			.05
6003	60101	60203	2	25.	5.	5.	200.			.05
6004	60101	60204	2	25.	5.	5.	200.			.05
8001	80101	80301	2	6.81	2.61	2.61	400.			.017
8002	80301	80201	1	19.63	5.	5.	350.	.18		.017
8003	80201	80501	2	33.06	5.75	5.75	950.			.017
8004	80101	80302	2	6.81	2.61	2.61	500.		.03	.017
8005	80302	80201	2	6.81	2.61	2.61	350.	.77		.017
8006	80202	81201	1	1.23	1.25	1.25	1677.			.015
8107	81101	81301	4	1.58	1.67	1.25	290.		1.5	.017
8108	81301	81501	1	4.91	2.5	2.5	280.	2.		.017
8109	81201	82401	1	1.23	1.25	1.25	1100.		.48	.015
8110	82401	82201	4	4.59	3.	2.	1440.			.017
8210	82101	82301	4	9.35	4.	3.	625.		2.55	.017
8211	82301	82501	4	9.35	4.	3.	500.	2.3		.017
8212	82201	83201	1	7.07	3.	3.	1783.			.017
8313	83101	83301	4	3.2	2.5	1.67	660.		1.7	.017
8314	83301	83501	5	3.7	2.25	2.	400.	1.7		.017
8315	83201	84201	1	7.07	3.	3.	1017.			.017
8416	84101	84301	1	19.63	5.	5.	500.		1.35	.017
8417	84301	84501	1	19.63	5.	5.	230.	1.49		.017
8420	84201	84303	4	10.34	4.5	3.	1440.			.017

(1) See Figure VII-17A.

(2) Pipe shape; 1-circle, 2-rectangle, 3-horseshoe, 4-egg, 5-ovoid

(3) Distance of conduit invert above upstream node invert.

(4) Distance of conduit invert above downstream node invert.

CONDUIT DATA FOR TRANSPORT BLOCK - SOUTH BOSTON

- Continued -

CONDUIT NUMBER	JUNCTIONS AT ENDS		TYPE	AREA (sq.ft.)	DEPTH (ft.)	WIDTH (ft.)	LENGTH (ft.)	ZUP	ZDOWN	MANNING'S N
8421	84303	85201	4	10.34	4.5	3.	640.		.98	.017
8430	84303	86212	2	27.50	2.5	11.0	400.	2.0		.017
8522	85101	85301	2	25.	5.	5.	260.		.93	.015
8523	85301	85501	1	23.76	5.5	5.5	670.	1.4		.017
8524	85201	86555	4	10.34	4.5	3.	1780.		.97	.017
8600	86210	86310	1	86.59	10.5	10.5	750.			.017
8606	86107	86213	4	9.04	4.	3.	400.			.017
8607	86213	86306	4	9.04	4.	3.	200.		3.1	.017
8608	86106	86305	1	15.90	4.5	4.5	570.		.6	.017
8609	86205	86306	1	1.23	1.25	1.25	600.		4.	.015
8611	86210	86310	2	24.	6.	4.	750.			.017
8612	86210	86405	1	86.59	10.5	10.5	1500.			.017
8613	86405	86506	1	86.59	10.5	10.5	2000.			.017
8654	86305	86208	2	16.	4.	4.	270	1.55		.015
8655	86306	86208	3	53.	6.25	10.33	860.	8.9		.017
8656	86208	86502	3	53.	6.25	10.33	1000.			.017
9201	86555	86306	1	28.27	6.	6.	660.			.017
9203	86306	86404	1	28.27	6.	6.	1400.			.017
9204	86404	86222	1	33.18	6.5	6.5	600.		3.4	.015
9211	86199	86222	1	63.62	9.	9.	2750.			.017
9212	86222	87555	1	86.59	10.5	10.5	750.			.017
9214	87555	86310	1	86.59	10.5	10.5	250.		.63	.017
9221	86310	86212	3	59.57	7.25	9.67	3175.			.015
9222	86212	60101	3	59.57	7.25	9.67	250.			.015

JUNCTION DATA FOR TRANSPORT BLOCK - DORCHESTER

- Continued -

Junction	Ground Surface Elevation (ft)	Invert Elevation (ft)	Dry Weather Flow (cfs)
89100	17.7	8.4	
89101	15.1	7.6	
89102	24.9	14.5	
89103	25.2	14.4	
89105	63.9	52.3	0.16
89201	17.4	.76	
89202	16.8	3.	
89206	30.4	8.5	
89207	14.3	-.3	
89210	19.2	0.0	
89301	17.5	4.9	
89302	18.2	5.8	
89303	40.0	31.5	
89304	30.4	21.4	
89305	19.5	5.7	
89436	18.8	-.45	
89440	40.0	26.5	
89501	11.0	-.33	

JUNCTION DATA FOR TRANSPORT BLOCK - DORCHESTER[1]

Junction	Ground Surface Elevation (ft)	Invert Elevation (ft)	Dry Weather Flow[2] (cfs)
1	14.0	5.0	
100	25.0	12.2	
101	25.0	12.0	
9101	65.9	49.8	.15
9105	28.0	4.36	
9110	36.3	24.7	
9112	36.4	26.4	1.11
9113	36.4	18.6	
9201	22.3	7.1	
9202	22.4	9.6	
9203	21.9	11.3	
9204	24.9	13.58	
9205	21.5	10.5	
9206	21.0	3.4	
9207	19.1	-.20	
9208	17.5	-.86	
9209	16.0	1.11	
9210	16.0	0.86	
9211	22.6	3.8	1.14
9212	24.0	12.0	
9214	20.9	13.0	
9215	23.1	9.6	0.19
9222	15.0	2.9	
9223	13.0	1.3	
9230	21.8	2.53	
9231	17.1	6.0	
9301	26.7	13.8	
9302	22.4	7.5	
9303	21.9	14.8	
9304	24.9	15.3	
9305	23.4	12.5	
9306	21.0	10.67	
9308	15.1	7.7	
9420	17.8	3.1	
9421	17.4	1.9	.09
9423	16.2	1.2	
9501	20.0	0.72	
9505	10.0	-2.2	
10001*	20.8	6.4	
10002*	17.75	9.23	
10003*	17.9	8.5	
10004*	17.4	2.76	
10005*	19.2	3.4	

*Nodes not shown on system schematic.

(1) See Figure VII-17B.

(2) Represents dry weather flows input at nodes only; other dry weather flows contained in conduit data for RUNOFF block (see Table VII-7B).

JUNCTION DATA FOR TRANSPORT BLOCK - DORCHESTER[1]

- Continued -

Junction	Ground Surface Elevation (ft)	Elevation (ft)	Dry Weather Flow (cfs)
10006*	18.4	1.25	
10007*	20.8	1.9	
10008*	21.8	3.43	
10009*	15.5	1.0	
10010*	16.2	4.2	
10011*	17.2	-5.8	
10012*	30.4	23.2	
10013*	14.0	5.0	
10014*	17.6	1.78	
10015*	15.1	13.0	
87100	20.8	10.5	
87101	20.5	7.3	
87104	28.6	13.2	
87202	27.	-1.2	
87203	20.5	-1.9	.68
87204	15.5	-2.6	
87206	19.0	6.2	
87222	30.0	11.8	
87301	22.7	11.6	
87302	17.6	-3.22	
87305	15.8	10.5	
87426	19.2	-2.9	
87428	18.4	4.3	
87501	16.6	0.9	
87502	16.1	-.1	
87505	10.0	7.5	
87555	17.2	-12.3	
88101	18.5	8.4	
88102	28.5	19.3	
88103	17.8	9.7	
88106	34.9	23.9	
88107	28.8	18.2	
88201	20.8	-1.	
88202	18.4	4.1	
88205	19.9	8.4	
88206	18.4	-.75	
88215	17.75	5.23	
88301	14.0	0.0	
88302	17.9	4.2	
88303	17.55	-0.6	
88304	21.1	6.1	
88309	26.8	15.5	
88331	19.9	14.08	
88420	17.6	.04	

*Node not shown on system schematic.

CONDUIT NUMBER	JUNCTIONS AT ENDS		TYPE[2]	AREA (sq ft)	DEPTH (ft)	WIDTH (ft)	LENGTH (ft)	ZUP[3]	ZDOWN[4]	MANING's N
1	9302	9202	2	28.2	4.7	6.	182.	3.1	1.0	.040
2	9306	9206	2	27.0	4.5	6.	175.	1.5	8.8	.040
3	9304	9204	2	14.0	2.8	5.	110.	1.0	2.7	.040
4	9303	9203	2	12.6	2.1	6.	365.	2.1	5.6	.080
5	9305	9205	2	24.	4.0	6.	162.	1.0	3.4	.040
6	88303	88420	2	9.6	1.6	6.	252.	3.4	2.8	.080
7	10013	1	2	70.	5.0	14.	248.			.040
8	87301	87206	2	36.4	9.1	4.	196.	1.0	2.9	.040
9	87305	87206	2	21.0	3.0	7.	134.	2.0	1.9	.040
11	89302	10004	1	.785	1.	1.	200.		2.94	.0133
12	89301	10004	1	3.14	2.	2.	200.		2.04	.0159
13	89305	10005	1	1.23	1.25	1.25	200.		3.4	.014
14	88302	10006	1	4.91	2.5	2.5	200.		2.04	.0171
15	88304	10006	1	.785	1.	1.	200.		2.55	.0133
16	88331	10007	1	.785	1.	1.	200.		2.91	.0133
200	100	101	2	100.	10.	10.	200.			.017
*1001	10001	88201	1	2.10	1.67	1.67	200.			.005
*1002	10002	88215	1	3.14	2.	2.	200.			.005
*1003	10003	88302	5	0.04	4.	3.	200.			.005
*1004	10004	89201	1	3.14	2.	2.	200.			.005
*1005	10005	89210	1	1.23	1.25	1.25	200.			.005
*1006	10006	88206	1	4.91	2.5	2.5	200.			.005
*1007	10007	88201	1	.79	1.	1.	200.			.005
*1008	10008	09230	1	1.77	1.5	1.5	200.			.005
*1009	10009	87204	1	3.14	2.	2.	200.			.005
*1010	10010	09423	1	3.14	2.	2.	200.			.005
*1011	10011	87555	1	8.05	3.2	3.2	200.			.005
*1012	89304	10012	1	1.77	1.5	1.5	200.			.005
*1013	88301	10013	2	70.	5.	14.	200.			.005
*1014	87302	10014	2	49.	7.	7.	200.			.005
*1015	09308	10015	1	3.14	2.	2.	200.			.005
8700	87100	87101	1	.785	1.25	1.25	200.		0.4	.015
8701	87101	10001	1	2.19	1.67	1.67	300.		7.4	.015
8704	87104	87301	5	7.20	3.33	2.67	660.			.017
8705	87301	87305	5	7.20	3.33	2.67	325.			.017
8706	87305	10009	1	3.14	2.	2.	200.		3.6	.015
8751	87206	87428	1	33.20	6.5	6.5	1550.			.017
8752	10014	87501	2	49.0	7.	7.	1100.	5.0		.015
8753	87428	87501	2	64.	8.	8.	1200.			.015
8754	87501	87502	2	100.	10.	10.	600.			.015
8761	87222	87505	1	3.14	2.	2.	200.	0.0	0.0	.015

(1) See Figure VII-17B.
(2) Pipe shape: 1-circle, 2-rectangle, 3-horseshoe, 4-egg, 5-ovoid
(3) Distance of conduit invert above upstream node invert.
(4) Distance of conduit invert above downstream node invert.
*Conduits not shown on system schematic.

CONDUIT DATA FOR TRANSPORT BLOCK - DORCHESTER

- Continued -

CONDUIT NUMBER	JUNCTIONS AT ENDS		TYPE	AREA (sq ft)	DEPTH (ft)	WIDTH (ft)	LENGTH (ft)	ZUP	ZDOWN	MANNING'S N
8801	88103	10003	5	9.04	4.	3.	400.	0.0	0.0	.017
8802	88101	88304	4	6.25	3.5	2.33	730.	0.0	0.0	.017
8805	88102	88331	5	2.57	2.17	1.67	1340.	0.0	.1	.017
8806	88106	88309	1	7.07	3.	3.	800.	0.0	1.1	.017
8807	88107	88309	5	2.57	2.17	1.67	350.	0.0	.8	.017
8818	88309	88103	5	9.24	4.	3.	1400.	.8	0.0	.017
8851	88205	88215	2	30.22	5.33	5.67	630.	0.0	0.0	.015
8852	88215	88202	2	32.0	5.33	6.	970.	0.0	0.0	.015
8853	88331	10002	1	3.14	2.	2.	200.	1.2	0.0	.015
8854	88304	88215	1	7.07	3.	3.	200.	1.1	0.0	.015
8855	88302	88202	1	19.63	5.	5.	200.	1.5	0.0	.017
8858	88309	88205	1	9.62	3.5	3.5	650.	2.1	0.0	.017
8900	89100	89302	1	12.57	4.	4.	350.	0.0	1.1	.017
8901	89101	89301	4	9.34	4.	3.	1620.	0.0	0.5	.017
8902	89102	89302	4	3.92	2.50	2.00	630.	0.0	1.8	.017
8903	89303	89304	5	3.98	2.58	2.	535.	0.0	0.0	.017
8904	89105	89303	5	3.98	2.58	2.	790.	0.0	0.0	.017
8908	89304	89305	5	6.00	3.25	2.5	1120.	0.0	1.7	.017
8909	89103	89305	1	7.07	3.	3.	200.	0.0	2.1	.017
8951	89206	88202	1	28.30	6.	6.	1000.	0.0	0.0	.017
8952	88202	88420	3	64.46	13.5	8.	250.	0.0	0.0	.017
8953	88420	88301	3	132.	12.	11.	1460.	0.0	0.0	.015
8954	89302	89202	1	12.57	4.	4.	250.	2.3	0.0	.017
8955	89301	89202	1	12.57	4.	4.	255.	1.7	0.0	.017
8956	89202	88301	1	38.48	7.	7.	245.	1.1	0.0	.017
8957	88301	89207	2	80.	10.	8.	1280.	0.0	0.0	.015
8958	89207	89501	2	80.	10.	8.	1980.	0.0	0.0	.015
8960	89303	89440	1	1.77	1.5	1.5	200.	1.3	0.0	.015
8961	89440	89206	1	15.90	4.5	4.5	530.	0.0	0.0	.017
8962	10012	88206	1	1.77	1.5	1.5	200.	0.0	0.0	.015
8963	89305	88202	2	16.	4.	4.	270.	.5	0.0	.017
9001	09113	09302	4	12.76	5.	3.33	625.	0.0	1.6	.017
9002	09302	10008	1	1.77	1.5	1.5	200.	0.0	0.0	.015
9005	09101	09301	4	5.20	2.92	2.25	1510.	0.0	0.1	.017
9011	09301	09306	4	7.45	3.5	2.67	1200.	0.0	0.4	.017
9013	09212	09306	4	5.20	2.92	2.25	475.	0.0	0.0	.017
9015	09306	09215	4	7.45	3.5	2.67	350.	0.0	0.0	.017
9016	09110	09304	4	4.59	3.	2.	260.	0.0	0.1	.017
9017	09304	09214	1	.79	1.	1.	450.	0.0	0.0	.015
9021	09112	09303	4	5.20	2.92	2.25	620.	0.0	0.0	.017
9022	09303	09214	4	5.20	2.92	2.25	800.	0.2	0.0	.017
9023	09214	09305	4	4.91	2.50	2.50	200.	0.0	0.0	.017

CONDUIT DATA FOR TRANSPORT BLOCK - DORCHESTER

- Continued -

CONDUIT NUMBER	JUNCTIONS AT ENDS		TYPE	AREA (sq ft)	DEPTH (ft)	WIDTH (ft)	LENGTH (ft)	ZUP	ZDOWN	MANNING'S N
9024	09305	09215	4	5.20	2.92	2.25	1180.			.017
9025	09215	09308	4	7.45	3.5	2.67	775.			.017
9026	09308	89101	1	3.14	2.	2.	200.			.017
9027	10015	10010	1	3.14	2.	2.	200.			.015
9030	09301	09201	4	6.71	3.5	2.5	370.	1.75		.017
9050	09203	09205	3	39.05	8.	6.5	500.			.017
9051	09204	09205	1	9.62	3.5	3.5	825.			.017
9052	09205	09201	3	34.3	8.	6.	830.			.017
9053	09201	09206	3	34.3	8.	6.	840.			.017
9055	09206	09207	3	130.5	14.	12.	745.			.017
9057	09207	09208	3	121.8	14.	11.5	1325.			.017
9058	09202	09208	1	12.57	4.	4.	305.			.017
9059	09208	09209	3	121.8	14.	11.5	50.			.017
9060	09209	09210	3	80.55	8.	12.	700.			.015
9061	09210	09501	2	132.	11.	12.	400.			.017
9062	09222	09223	1	28.27	6.	6.	300.		.7	.015
9063	09223	09505	1	28.27	6.	6.	400.			.015
9070	09231	10008	1	1.77	1.5	1.5	600.			.015
9101	09105	09211	1	15.9	4.5	4.5	1400.			.017
9102	09211	09420	1	15.9	4.5	4.5	1750.			.017
9103	09420	09230	1	15.9	4.5	4.5	1425.			.017
9104	09230	09421	1	15.9	4.5	4.5	1575.			.017
9106	09421	09423	1	15.9	4.5	4.5	1625.			.017
9107	09423	89201	1	15.9	4.5	4.5	825		.11	.017
9108	89201	89210	1	19.63	5.	5.	1382.			.017
9109	89436	88303	1	19.63	5.	5.	326.			.017
9110	88303	88206	1	19.63	5.	5.	800.			.017
9111	88206	88201	1	19.63	5.	5.	455.			.017
9112	88201	87202	1	19.63	5.	5.	417.			.017
9113	87202	87203	1	19.63	5.	5.	1458.			.017
9114	87203	87204	1	19.63	5.	5.	1458.			.017
9115	87204	87426	1	19.63	5.	5.	625.			.017
9116	87302	10011	1	3.14	2.	2.	200.			.016
9117	87302	10011	1	4.91	2.5	2.5	200.			.017
9210	89210	89436	1	19.63	5.	5.	214.			.017
9220	87426	87302	1	19.63	5.	5.	246.			.017

APPENDIX B

REPORT ON THE UNIFIED INTERCEPTOR MODELING

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
REPORT ON THE UNIFIED INTERCEPTOR MODELING

January 31, 1980

CONTENTS

1. Purpose of the Model

2. Model Development
   - Scope
   - Data Base
   - Schematic Representation of the Interceptor System

3. Modeling Assumptions and Basis
   - Interceptor Modeling Concept
   - Dry Weather and Wet Weather Flows
   - Pumping Station and Headworks Operating Conditions

4. Calibration and Verification
   - Simulation of an Actual Storm Event

5. Interceptor System Simulations
   - Boundary Conditions
   - Event Modeling
   - Wet Weather Flow Apportionment

1. PURPOSE OF THE MODEL

A model of the interceptor system within the Combined Sewer Overflow (CSO) Project area was developed for the purpose of coordinating the combined sewer modeling by the four planning area consultants. The existing interceptor system and proposed improvements to it were modeled. The modeling coordination was achieved by modeling the interceptor system for selected storm events, and determining approximate hydraulic conditions at the planning area boundaries. The boundary conditions (described later) were provided to the area consultants for use in their individual study area models.

2. MODEL DEVELOPMENT

Scope. The interceptor system tributary to Deer Island, and within the Dorchester Bay, Inner Harbor and Neponset River Estuary study areas, was modeled using the TRANSPORT block of the Storm Water Management Model (SWMM). TRANSPORT and SWMM are described in Chapter VII. The geographic extent of the unified interceptor model is shown on Figure 1. The major interceptors and facilities which were modeled include the following:

Interceptors	Facilities
Boston Main Interceptor	Deer Island Pumping Station
East Side Interceptor	Winthrop Terminal Facility
Dorchester Interceptor	Columbus Park Headworks
South Boston Interceptor (North and South Branches)	Chelsea Creek Headworks
East Boston Branch Sewer	Ward Street Headworks
Cambridge Branch Sewer	Charlestown Pumping Station
Charlestown Branch Sewer	East Boston Steam Pumping Station
Somerville-Medford Branch Sewer	East Boston Electric Pumping Station
North Metropolitan Relief Sewer	Calf Pasture Pumping Station
North Metropolitan Trunk Sewer	
Boston Main Drainage Tunnel	
North Metropolitan Relief Tunnel	
Columbus Park Connection	

The unified interceptor model incorporated hydraulic controls at the boundaries of the Charles River Basin planning area. These controls are:

- the Alewife Brook Pumping Station
- the Cambridge Branch Sewer at the Charlestown Pumping Station
- the Ward Street Headworks
- the junction of the Boston Main Drainage Relief Sewer and the Boston Main Interceptor.

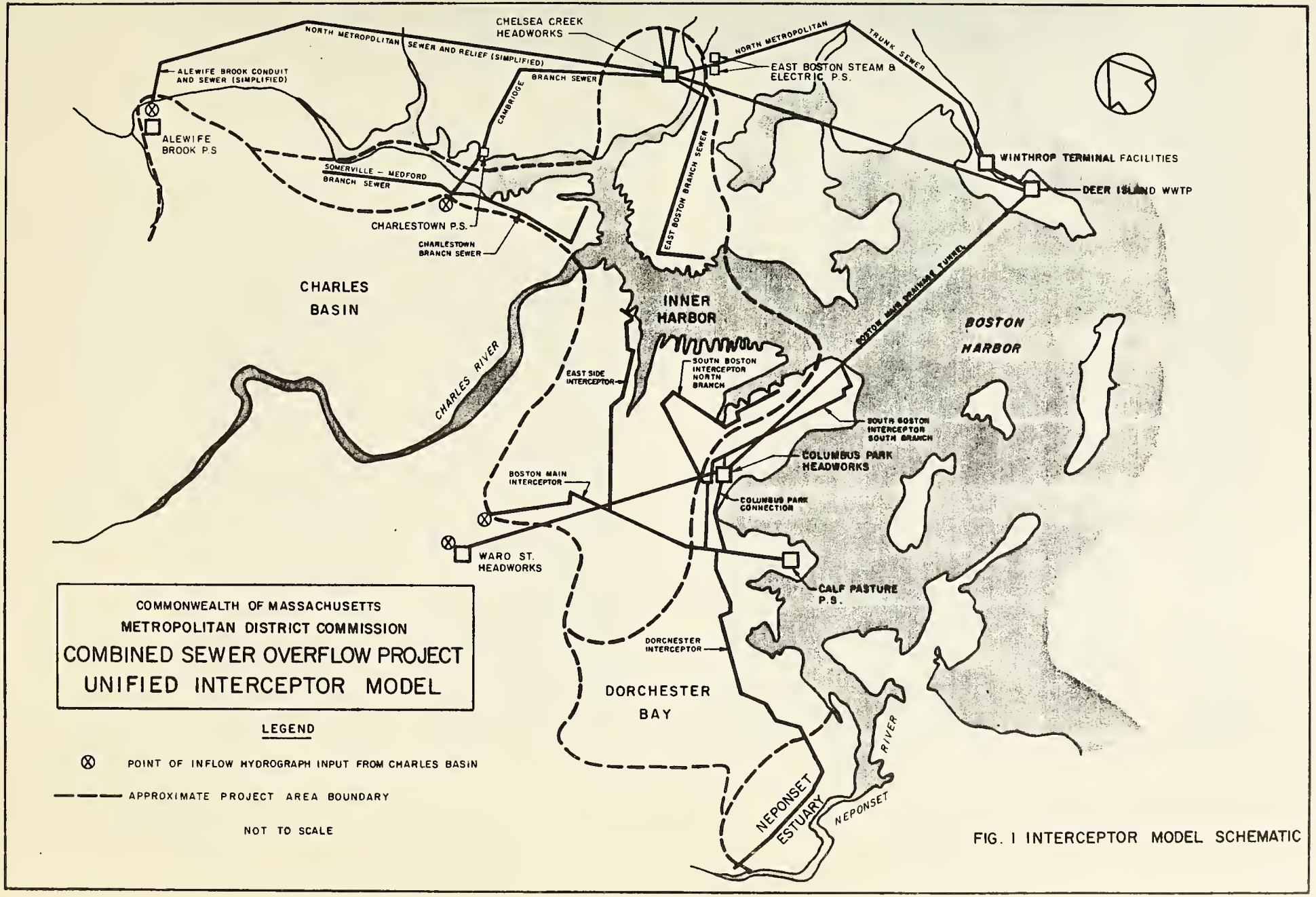


FIG. 1 INTERCEPTOR MODEL SCHEMATIC

Inflow hydrographs were developed for the interceptor model at these controls by the Charles River Basin consultant. Therefore, the unified interceptor model simulated the major interceptor system within the Inner Harbor, Dorchester Bay and Neponset River planning areas, and used inflow hydrographs from the Charles River Basin area.

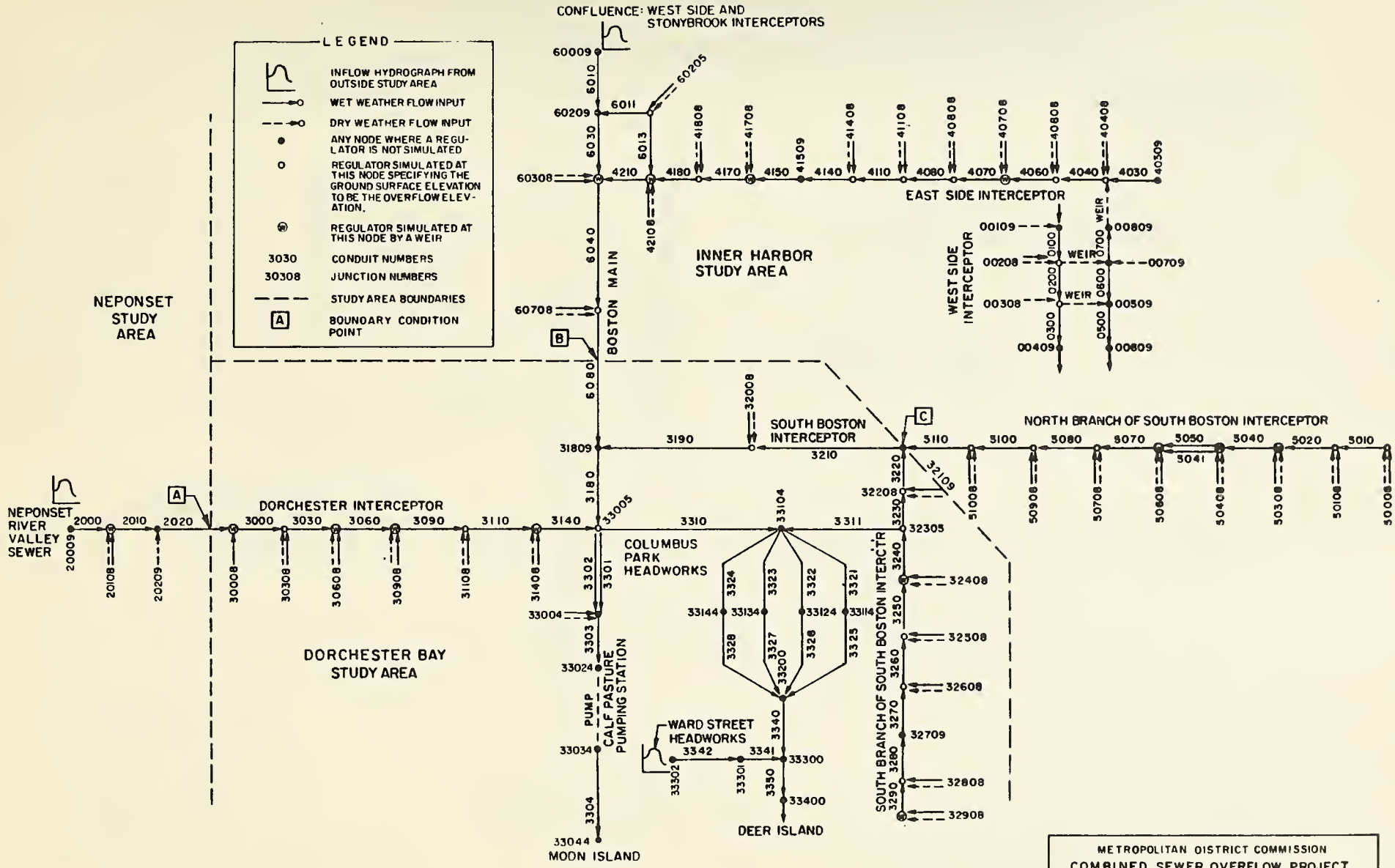
Data Base. Data for developing the model were obtained from the planning area consultants and from MDC Sewerage Division record drawings. The planning area consultants' data consisted of calibrated SWMM network data and sewer drawings. Data from the Sewerage Division were obtained for interceptors located outside of the study area, such as the North Metropolitan trunk and relief sewers in Medford and Winthrop.

Schematic Representation of the Interceptor System. Schematic diagrams showing the interceptor networks as modeled are shown on Figures 2, 2A, and 3. Figures 2 and 3 show the existing interceptor system which is composed of the Ward-Columbus Headworks System and the Chelsea Creek Headworks System. Figure 2A shows proposed improvements to the interceptor system which were modeled for recommended plan simulations, including replacement of the Boston Main interceptor and the East Side interceptor. These improvements are described in detail in the CSO control facilities plan for the Inner Harbor area. Operating conditions for pumping stations and headworks are discussed in Section 3. A description of the modeling of the existing and future interceptor networks is given in Section 5. Tables 2 and 3 at the end of this appendix provide data on the simulated interceptors.

3. MODELING ASSUMPTIONS AND BASIS

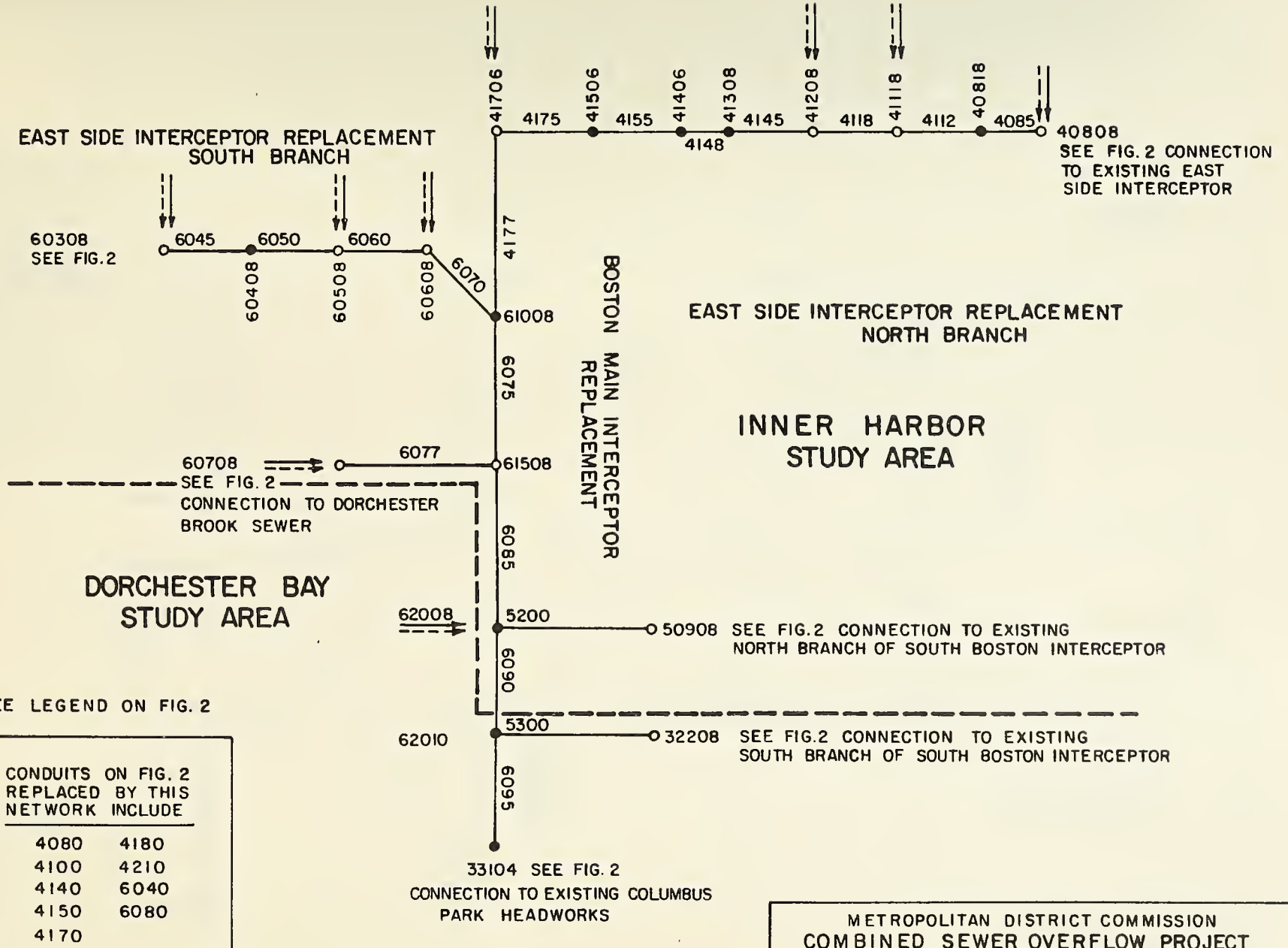
Interceptor Modeling Concept. The unified interceptor model simulates flow downstream of the combined sewer regulators and connections to the interceptor system. Combined sewer loadings are modeled as having dry weather and wet weather flow components. Average dry weather flow is present at the initial condition. Wet weather flows enter the modeled interceptor system up to the capacity of the interceptor. Under wet weather conditions, when the simulated stage in the interceptor reaches the elevation of the regulator connection, then flow from the combined sewer is lost from the interceptor system. This loss of flow represents a combined sewer overflow event.

The effect of tides on the interceptor system was not modeled. High tide stages can inhibit the release of CSO from combined sewers, and thereby keep more wet weather flow within the combined sewer and interceptor systems. One of the intentions of the interceptor modeling was to establish the approximate apportionment of interceptor and treatment plant capacity among the four planning areas. It was chosen to establish this apportionment based on average tide and dry weather base flow conditions. Analysis of tidal impacts within the combined sewer of the individual planning areas was performed by the area consultants.


LEGEND
INFLOW HYDROGRAPH FROM OUTSIDE STUDY AREA
WET WEATHER FLOW INPUT
DRY WEATHER FLOW INPUT
ANY NODE WHERE A REGULATOR IS NOT SIMULATED
REGULATOR SIMULATED AT THIS NODE SPECIFYING THE GROUND SURFACE ELEVATION TO BE THE OVERFLOW ELEVATION.
REGULATOR SIMULATED AT THIS NODE BY A WEIR
3030 CONDUIT NUMBERS
30308 JUNCTION NUMBERS
STUDY AREA BOUNDARIES
A BOUNDARY CONDITION POINT
CONFLUENCE: WEST SIDE AND STONYBROOK INTERCEPTORS
EAST SIDE INTERCEPTOR
WEST SIDE INTERCEPTOR
WEIR
INNER HARBOR STUDY AREA
BOSTON MAIN
NEPONSET STUDY AREA
SOUTH BOSTON INTERCEPTOR
NORTH BRANCH OF SOUTH BOSTON INTERCEPTOR
NEPONSET RIVER VALLEY SEWER
DORCHESTER INTERCEPTOR
COLUMBUS PARK HEADWORKS
SOUTH BRANCH OF SOUTH BOSTON INTERCTR
DORCHESTER BAY STUDY AREA
PUMP
CALF PASTURE PUMPING STATION
WARD STREET HEADWORKS
DEER ISLAND
MOON ISLAND

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 2 WARD-COLUMBUS SYSTEM



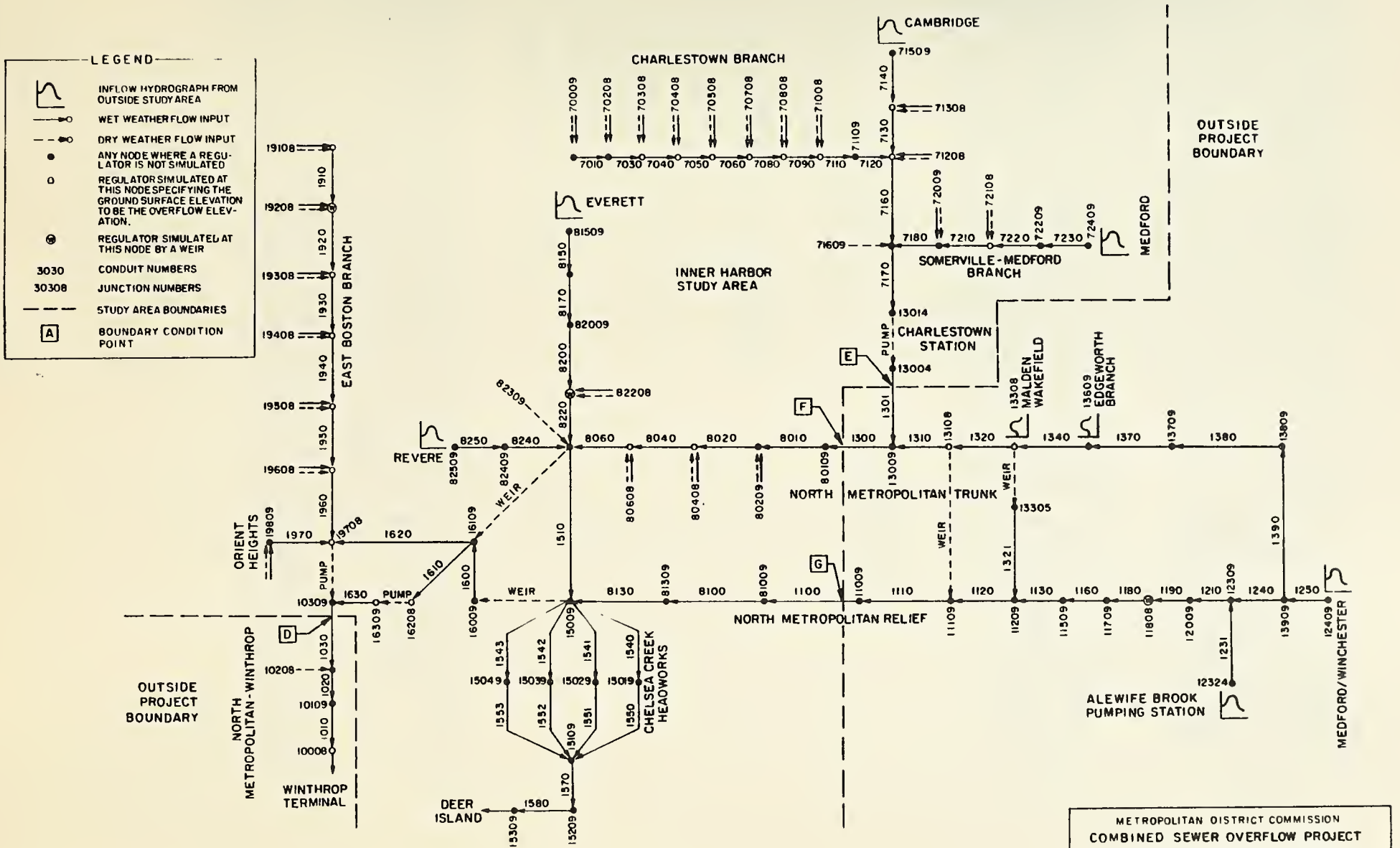
SEE LEGEND ON FIG. 2

CONDUITS ON FIG. 2 REPLACED BY THIS NETWORK INCLUDE

4080	4180
4100	4210
4140	6040
4150	6080
4170	

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 2A NETWORK FOR BMI RELOCATION ON THE WARD-COLUMBUS SYSTEM



METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 3 CHELSEA CREEK SYSTEM

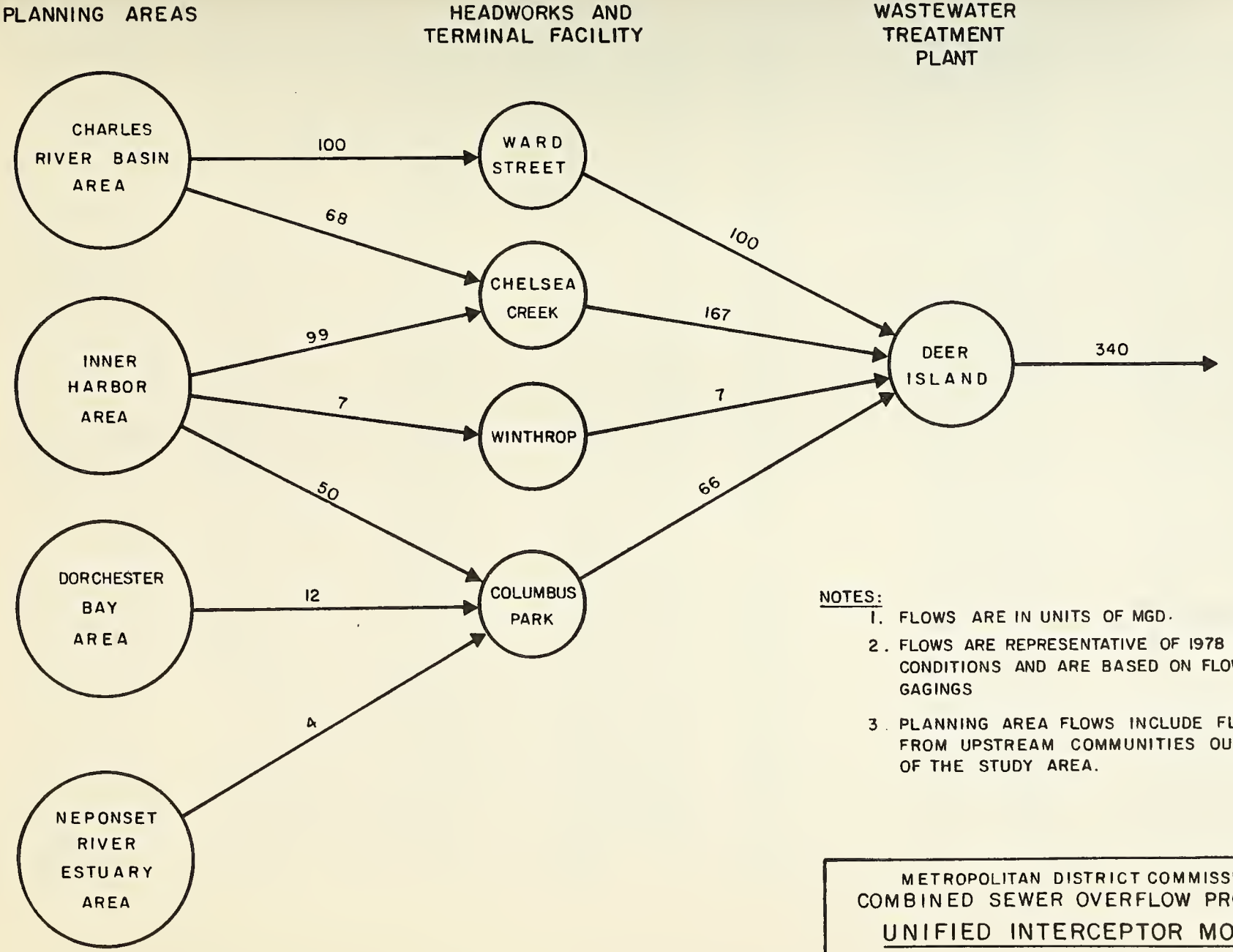
Dry Weather and Wet Weather Flows. Average dry weather flow, as determined by the area consultants during the 1978 and 1979 field programs, was used for modeling existing conditions. Where gaging data was not available outside of the study area, information from the Deer Island I/I study completed in 1978 was utilized. The dry weather flows include infiltration; and, the resultant average flow at Deer Island for existing conditions is approximately 340 mgd. For future year 2005 conditions, a 400-mgd flow at Deer Island was used based on projections by the EMMA Study of 1975. Figure 4 shows the resulting dry weather flow balance used in modeling existing conditions.

Wet weather flows were simulated by three methods. First, inflow hydrographs were used for flows from the control points at the boundary of the Charles River Basin area (described previously). Second, at trunk sewers and interceptors entering the study area from separate sewer areas, full, normal flow was assumed to be achieved within one hour after start of the storm. These flows are based on worst-case conditions of upstream infiltration and inflow, and are given below:

Trunk Sewer	Assumed Wet Weather Flow (cfs)
Somerville-Medford Branch from Medford	4.7
North Metropolitan Relief Sewer from Medford and Winchester	162.7
Edgeworth Branch Sewer	5.7
Malden and Wakefield Branch Sewers	69.4
Chelsea Branch Sewer	18.3
Revere Extension Sewer	33.6

Third, at combined sewer regulators, wet weather flows were based on the rational formula, Q=CIA. Runoff coefficients and areas for combined sewer regulator catchments were provided by the area consultants. Small catchment areas were consolidated for the purpose of interceptor modeling. Rainfall hyetographs were averaged over thirty minutes to allow for concentration time in the catchment areas.

Sewer separation is ongoing in some parts of the study area and has been proposed for other areas under the CSO Project Recommended Plan. The positive effect of sewer separation was incorporated in modeling future conditions.



NOTES:

1. FLOWS ARE IN UNITS OF MGD.
2. FLOWS ARE REPRESENTATIVE OF 1978 AND 1979 CONDITIONS AND ARE BASED ON FLOW GAGINGS
3. PLANNING AREA FLOWS INCLUDE FLOWS FROM UPSTREAM COMMUNITIES OUTSIDE OF THE STUDY AREA.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 4 DRY WEATHER FLOW BALANCE

Pumping Station and Headworks Operating Conditions. Simulation of the interceptor system required that the operating practices at the major pumping stations and at the headworks be incorporated in the programming. Design capacities were used for these facilities when modeling the existing system and future improvements. The headworks' capacities are based on one channel out of service. Capacity for the City of Boston's Calf Pasture Pumping Station was based on the design capacity of the three existing pumps.

MDC pumping station operators typically start their pumps manually, based on pre-determined wet well water surface elevations. These operating rules were reviewed, and general operating conditions were established. Table 1 gives the operating conditions used during the interceptor modeling. These operating conditions were used for establishing the flows and heads at planning area boundaries described in Section 5. Operating conditions for verification of the unified interceptor model are described in section 4.

4. MODEL CALIBRATION AND VERIFICATION

The unified interceptor model was developed from calibrated modeling network data provided by the area consultants. Therefore, an overall verification of the completed interceptor model was necessary.

Simulation of an Actual Storm Event. It was chosen to verify the model based on records from a moderate storm event which was fairly uniform over the study area. A review of the recent rainfall data showed that storms on March 7 and April 27, 1979, fit the needs for a verification event. The March 7 rainfall was more uniform, based on Logan Airport and Blue Hills Observatory hourly rainfall records, and it was chosen because operating records were more complete at the headworks and at Calf Pasture Pumping Station.

On March 7, capacity at the Ward Street and Columbus Park headworks was reduced temporarily to 80 and 75 mgd, respectively. Consequently, during the storm event, the Calf Pasture Pumping Station started operations to provide wet weather flow relief for the Boston Main Interceptor (BMI). Operations in the interceptor system tributary to the Chelsea Creek headworks do not directly affect operations at Calf Pasture Pumping Station.

The operating relationship in wet weather between the Ward Street and Columbus Park headworks, the BMI, and the Calf Pasture Pumping Station, and the consequent changes in flow in adjoining interceptors, is one of the most complex hydraulic relationships in the interceptor system of the study area. The modeling of the March 7 event attempted to simulate this relationship as verification of the interceptor model.

Simulation of the March 7 storm event proceeded as follows. The Logan Airport hourly rainfall data for March 7 between midnight and noon was entered into the model. The hourly operating record at the Columbus Park headworks was programmed into the model. An hourly flow hydrograph from the Charles River Basin planning area at the head of BMI was established, based on simulated flows in that planning area and records from the Ward Street headworks and Cottage Farm chlorination and detention station.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT

UNIFIED INTERCEPTOR MODEL

TABLE 1. OPERATING CONDITIONS FOR INTERCEPTOR MODELING

	WARD	COLUMBUS	CHELSEA	WINTHROP
A. Headworks and Winthrop Terminal Facility				
Hydraulic Capacity (mgd)	256	182	350	120*
B. Pumping Stations	East Boston			
	Steam	Electric	Charlestown	Calf Pasture***
Simulated Wet Well Capacity (cu. ft.)	870	1,585	23,722	8,840
Design Pumping Capacity (mgd)	100**	125**	140	99
Simulated Pumping Policy	(1)	(2)	(1)	(3)

(1) Pumps turn on when wet well is half-full and pump at maximum capacity.
(2) 50-mgd pump turns on when wet well is quarter-full, then 75-mgd pump turns on and 50 mgd pump turns off when wet well is half-full. Both pumps operate when wet well is three quarters-full.
(3) 3 pumps operate at 33-mgd each. First pump turns on when Columbus Park flow is 260 cfs, second when flow is 270 cfs, third at 280 cfs.

*90 mgd to WWTP, 30 mgd bypass to outfall.
**Total capacity of these stations is limited by the capacity in the downstream No. Metropolitan Sewer and the Winthrop Terminal Facility.
***The Calf Pasture pumping station was not included in modeling future improvements, but was assumed to be eliminated.

Based on the preceding inputs, the hydraulic activity at the Calf Pasture Pumping Station was simulated. The simulated activity at Calf Pasture was then compared to the operating record of the station for March 7. Figure 5 shows the comparison between simulated and recorded conditions.

The Calf Pasture Pumping Station records include hourly measurements of depth in the influent sewer. The simulated depths are slightly lower than the recorded values, and this could be due to the effect of a high tide stage during the storm. High tide on that day was at 6:12 AM. It was concluded, based on this simulation and sensitivity analyses, that the unified interceptor model provided an adequate representation of the interceptor system, and further model calibration was not performed.

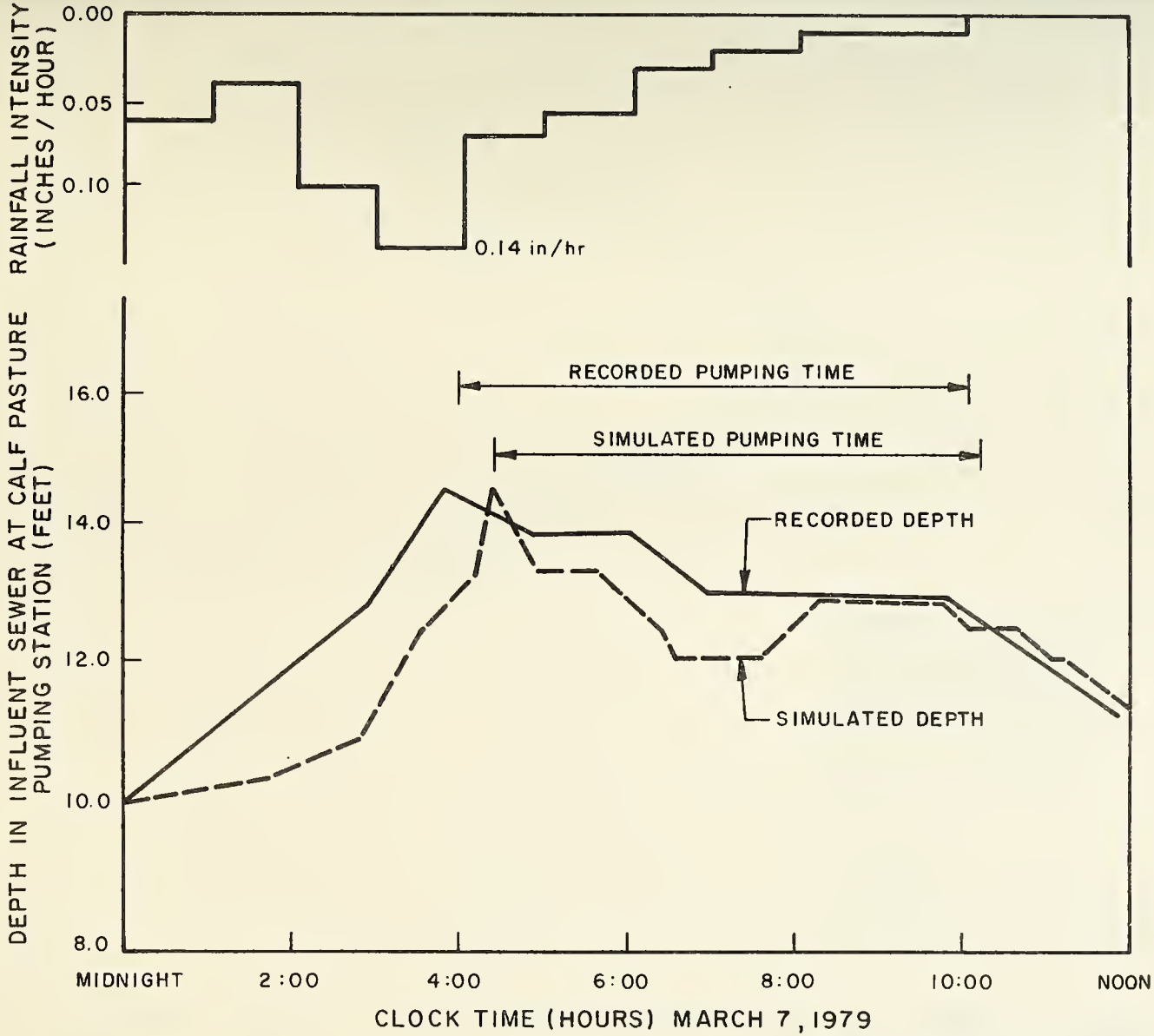
5. INTERCEPTOR SYSTEM SIMULATIONS

Boundary Conditions. The existing interceptor system and improvements proposed to it under the recommended plan were simulated and boundary conditions were developed for points where the major interceptors cross planning area boundaries. The boundary condition information consisted of approximate stage (water surface elevation) and discharge (flow rate) in the interceptors. The information was presented as stage-discharge-time curves, as shown on Figure 6, or as discharge hydrographs. Figure 6 is representative of the intercepor modeling results which were developed for the CSO planning. Such information was developed for specific storms and operation conditions as required for the area consultants' individual planning area models.

Event Modeling. The relationship between the unified interceptor model and the four planning area models, when modeling a storm event, is shown on Figure 7. A 1-year 6-hour storm, a 3-month 4-hour storm, and a 1-month 4-hour storm were selected, in order to model a range of storm event sizes. The hyetographs for these storms are given in Chapter VI . All of the models used identical synthetic rainfall hyetographs. The synthetic hyetrographs were reduced by an area to point rainfall intensity reduction factor of 0.83, based on a total modeling area of 51 square miles.

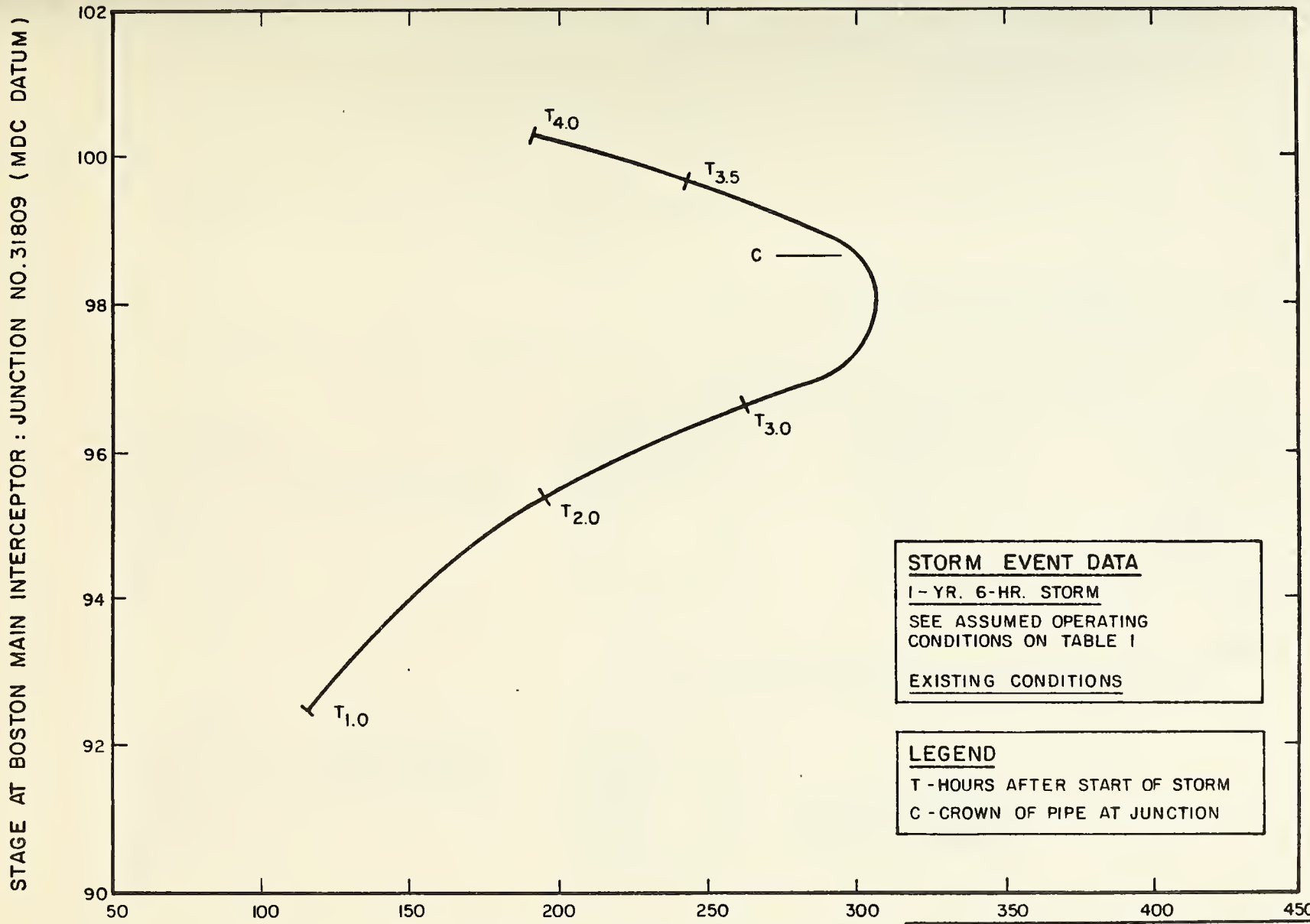
As shown in Figure 7, the Charles River Basin area combined sewer model was applied to develop hydrographs at the hydraulic control boundaries with the unified interceptor model. The unified interceptor model was then applied to develop boundary conditions for the Inner Harbor, Dorchester Bay, and Neponset River area combined sewer models.

After several simulations with the unified interceptor model under various system operating conditions, it was determined that the peak flow at the Neponset River area and Dorchester Bay area boundary was generally 12 to 15 mgd. This range of flows was used as an upper limit capacity for the Neponset River planning area.



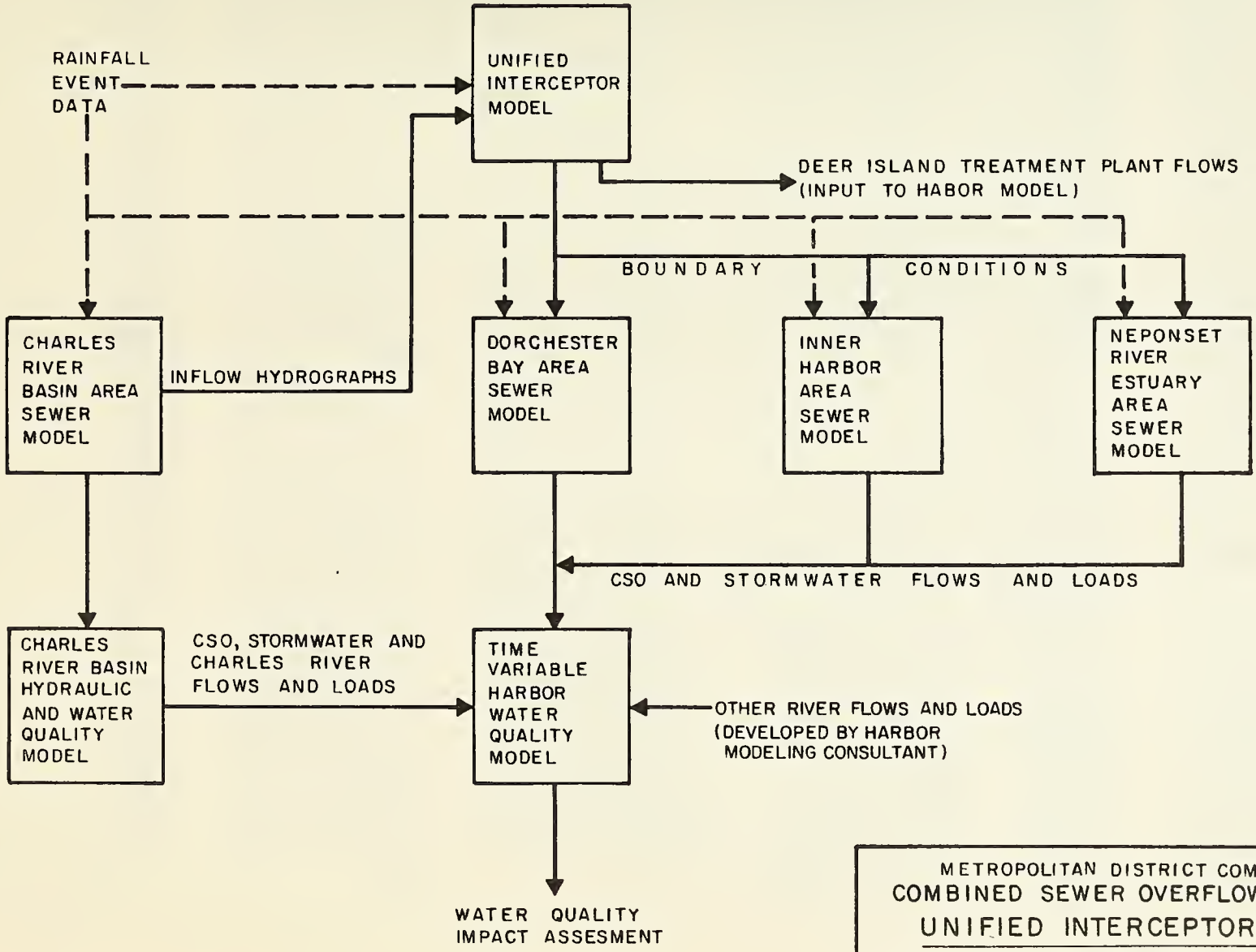
METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 5 RESULTS OF MARCH 7, 1979 STORM SIMULATION



METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 6 BOUNDARY CONDITION FOR BOSTON MAIN INTERCEPTOR


RAINFALL EVENT DATA
UNIFIED INTERCEPTOR MODEL
DEER ISLAND TREATMENT PLANT FLOWS (INPUT TO HABOR MODEL)
BOUNDARY CONDITIONS
CHARLES RIVER BASIN AREA SEWER MODEL
INFLOW HYDROGRAPHS
DORCHESTER BAY AREA SEWER MODEL
INNER HARBOR AREA SEWER MODEL
NEPONSET RIVER ESTUARY AREA SEWER MODEL
CSO AND STORMWATER FLOWS AND LOADS
CHARLES RIVER BASIN HYDRAULIC AND WATER QUALITY MODEL
CSO, STORMWATER AND CHARLES RIVER FLOWS AND LOADS
TIME VARIABLE HARBOR WATER QUALITY MODEL
OTHER RIVER FLOWS AND LOADS (DEVELOPED BY HARBOR MODELING CONSULTANT)
WATER QUALITY IMPACT ASSESMENT

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 7 EVENT MODELING INPUT AND OUTPUT RELATIONSHIPS

The planning area consultants used the boundary conditions provided by the unified interceptor model to perform the modeling and analysis of interceptors and combined sewers within their individual planning areas. The area consultants then developed CSO pollution load estimates for the habor model. (The harbor model is described in Chapter VIII of this report). The unified interceptor model was used to estimate Deer Island treatment plant flows during storm events for the harbor modeling, which completed the input of the land-side models for the harbor water quality assessment.

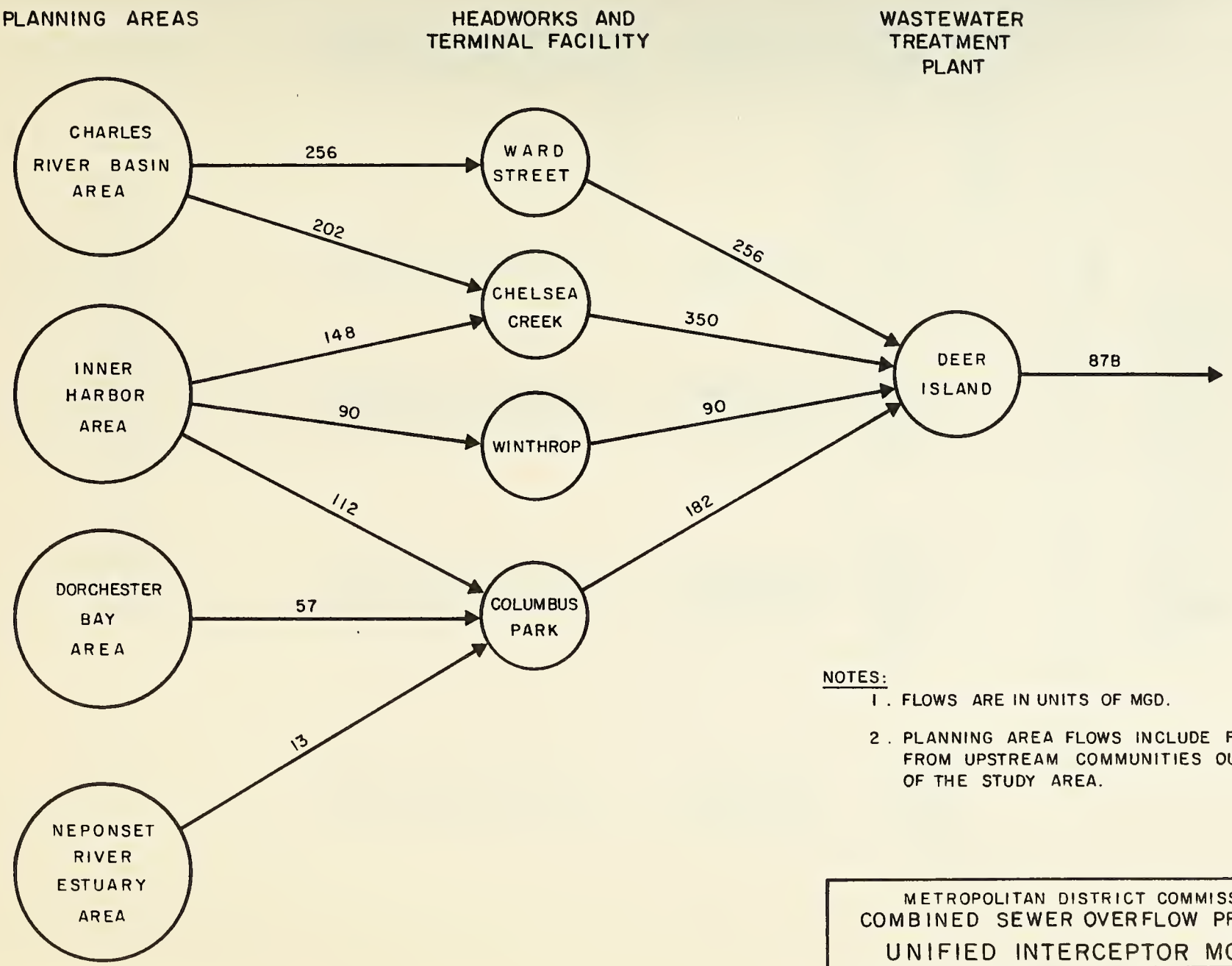
Wet Weather Flow Apportionment. One of the purposes of developing the interceptor model was to establish the apportionment of flows among the four planning areas. The apportionment of dry weather flow was shown on Figure 4. Figure 8 shows the apportionment of peak wet weather flow under the recommended plans for the four study areas.

The overall recommended plan for CSO control uses the existing maximum hourly hydraulic design capacity of the headworks facilities and the Deer Island wastewater treatment plant. The Ward Street, Chelsea Creek and Columbus Park facilities would receive design capacity flows totaling up to 788 mgd during major storm events and for a period of time following a storm while proposed storage facilities are being dewatered. Flows from the Winthrop Terminal facility to the Deer Island treatment plant would be pumped at 90 mgd, based on existing force main capacity. Thus, total wet weather peak flow at Deer Island would be 878 mgd.

In order to achieve the wet weather flow balance shown for the Columbus Park headworks, it is necessary to divert excess wet weather flow from the East Side Interceptor North Branch and the Dorchester Brook Sewer to the proposed Fort Point Channel facility in the Inner Harbor planning area. At present, the City of Boston's Calf Pasture Pumping Station is operated during certain storm events to relieve the Columbus Park headworks of excess wet weather flow. Under the recommended plan, which includes restoration of pumping capacity to design conditions at the Deer Island Pumping Station, the Calf Pasture Pumping Station could be phased out of service.

The diversion of excess wet weather flow to the Inner Harbor area's proposed Fort Point Channel facility was simulated when modeling future conditions. The unified interceptor model simulated a regulator device which would divert wet weather flow from the north branch of the East Side interceptor to maintain a total flow of 182 mgd or less at the Columbus Park headworks. The 182 mgd total includes a temporary peak capacity allocation of 70 mgd for the Dorchester Bay and Neponset River planning areas.

The simulated regulator device described above will be an important hydraulic control in the future interceptor system. The preliminary design of this structure is described in the Inner Harbor area facilities plan.



NOTES:

1. FLOWS ARE IN UNITS OF MGD.
2. PLANNING AREA FLOWS INCLUDE FLOWS FROM UPSTREAM COMMUNITIES OUTSIDE OF THE STUDY AREA.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL

FIG. 8 PEAK WET WEATHER FLOW BALANCE UNDER RECOMMENDED PLAN

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq. ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
West Side Interceptor (Canal Street Relief Sewer)				
100	1130	1.47	0.015	1.37
200	830	17.28	0.015	4.69
300	290	11.16	0.015	3.77
500	346	42.31	0.015	7.34
600	674	16.76	0.015	4.62
700	3220	23.76	0.015	5.50
East Side Interceptor				
4030	1287	4.91	0.015	2.50
4040	926	12.57	0.015	4.00
4060	490	23.76	0.015	5.50
4070	608	23.76	0.015	5.50
4080	1110	9.51	0.015	3.48
4110	2046	9.51	0.015	3.48
4140	900	9.51	0.015	3.48
4150	2676	15.90	0.015	4.50
4170	1426	24.45	0.015	5.58
4180	2461	24.45	0.015	5.58
4210	666	24.45	0.015	5.58

[1] See Unified Interceptor Model Schematic Figure 2.

[2] Irregular-shaped conduits modeled as equivalent circular sections.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq.ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
Boston Main Interceptor				
6010	2538	54.50	0.015	8.33
6011	256	0.79	0.015	1.00
6013	3240	27.34	0.015	5.90
6030	629	54.50	0.015	8.33
6040	2820	63.62	0.015	9.00
6080	4423	63.62	0.015	9.00
3180	1000	86.59	0.017	10.50
3301	750	24.00	0.017	6.00
3302	750	86.59	0.017	10.50
3303	3500	86.59	0.017	10.50
3304	1000	86.59	0.017	10.50
Dorchester Interceptor				
2000	1700	8.19	0.017	3.23
2010	2600	15.90	0.017	4.50
2020	1391	15.90	0.017	4.50
3000	4325	15.90	0.017	4.50
3030	4025	15.90	0.017	4.50
3060	1922	19.63	0.017	5.00
3090	1255	19.63	0.017	5.00
3110	3333	19.63	0.017	5.00
3140	1071	8.04	0.009	3.20
South Boston Interceptor (North Branch)				
5010	1212	4.60	0.015	2.42
5020	3663	9.35	0.015	3.45
5040	1119	9.35	0.015	3.45
5041	1043	9.35	0.015	3.45
5050	1043	12.76	0.015	4.03
5070	1000	12.69	0.015	4.02
5080	1709	12.69	0.015	4.02
5100	1823	20.19	0.015	5.07
5110	2293	20.99	0.015	5.17

(1) See Unified Interceptor Model Schematic Figure 2.
(2) Irregular-shaped conduits modeled as equivalent circular sections.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq. ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
South Boston Interceptor				
3190	2000	33.18	0.016	6.50
3210	660	28.27	0.017	6.00
South Boston Interceptor (South Branch)				
3220	1780	10.35	0.017	3.63
3230	640	10.35	0.017	3.63
3240	1440	10.35	0.017	3.63
3250	1017	7.07	0.017	3.00
3260	1783	7.07	0.017	3.00
3270	1440	4.60	0.017	2.42
3280	1100	1.23	0.015	1.25
3290	1677	1.23	0.015	1.25
Columbus Park Connection and Headworks				
3310	3425	59.58	0.017	8.71
3311	418	27.50	0.022	2.50
3321	400	100.00	0.015	5x20 (H x W)
3322	400	100.00	0.015	5x20 (H x W)
3323	400	100.00	0.015	5x20 (H x W)
3324	400	100.00	0.015	5x20 (H x W)
3325	400	9.62	0.015	3.50
3326	400	9.62	0.015	3.50
3327	400	9.62	0.015	3.50
3328	400	9.62	0.015	3.50
3340	5000*	63.62	0.015	9.00
Ward Street Headworks and Deer Island Tunnel				
3341	13800	78.54	0.015	10.00
3342	5000*	63.62	0.015	9.00
3350	23800	103.87	0.015	11.50

[1] See Unified Interceptor Model Schematic Figure 2.

[2] Irregular-shaped conduits modeled as equivalent circular sections except as noted.
*Drop shaft length is 290-ft. 5000-ft similated to represent headloss.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq.ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
Charlestown Branch Sewer				
7010	1160	3.91	0.015	2.23
7030	920	2.75	0.015	1.87
7040	1730	3.56	0.015	2.13
7050	600	4.49	0.015	2.39
7060	2250	5.47	0.015	2.64
7080	800	5.47	0.015	2.64
7090	1450	6.51	0.015	2.88
7110	2270	8.97	0.015	3.38
7120	1100	7.45	0.015	3.08
Cambridge Branch Sewer				
7130	2100	29.42	0.015	6.12
7140	1630	29.42	0.015	6.12
7160	840	36.10	0.015	6.78
7170	1735	36.10	0.031	6.78
1301	4935	33.59	0.016	6.54
Somerville-Medford Branch Sewer				
7180	3200	10.87	0.015	3.72
7210	1200	9.62	0.015	3.50
7220	1100	7.07	0.015	3.00
7230	3400	3.08	0.015	1.98

[1] See Unified Interceptor Model Schematic Figure 3.
[2] Irregular-shaped conduits modeled as equivalent circular sections.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq.ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
North Metropolitan Trunk Sewer				
1300	3572	60.68	0.016	8.79
1310	1821	31.07	0.016	6.29
1320	2358	31.07	0.016	6.29
1321	2579	15.90	0.016	4.50
1340	2929	19.95	0.019	5.04
1370	4750	19.95	0.016	5.04
1380	4753	17.13	0.016	4.67
8010	1685	60.41	0.015	8.77
8020	2515	61.24	0.015	8.83
8040	1804	64.75	0.015	9.08
8060	2076	64.75	0.015	9.08
North Metropolitan Relief Sewer				
1100	2926	99.40	0.015	11.25
1110	2002	86.59	0.015	10.50
1120	1080	88.58	0.015	10.62
1130	2665	69.25	0.018	9.39
1160	4656	58.49	0.016	8.63
1180	5353	58.49	0.015	8.63
1190	2006	58.49	0.016	8.63
1210	2740	58.49	0.016	8.63
1231	2415	23.76	0.015	5.50
1240	450	45.48	0.013	7.61
1250	571	45.48	0.015	7.61
8100	5100	99.40	0.015	11.25
8130	3450	99.40	0.015	11.25
1390	4217	15.90	0.016	4.50
1510	400	50.27	0.009	8.00

[1] See Unified Interceptor Model Schematic Figure 3.
[2] Irregular-shaped conduits modeled as equivalent circular sections, except as noted.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq. ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
Chelsea and Revere Branch Sewers				
8150	2512	3.20	0.015	2.02
8170	2850	5.94	0.015	2.75
8200	2820	9.62	0.015	3.50
8220	3000	4.83	0.015	2.48
8240	4137	15.90	0.015	4.50
8250	2788	12.57	0.015	4.00
Chelsea Creek Headworks and North Metropolitan Relief Tunnel				
1540	400	269.50	0.015	11x24.5 (HxW)
1541	400	269.50	0.015	11x24.5 (HxW)
1542	400	269.50	0.015	11x24.5 (HxW)
1543	400	269.50	0.015	11x24.5 (HxW)
1550	400	28.09	0.021	5.98
1551	400	28.09	0.021	5.98
1552	400	28.09	0.021	5.98
1553	400	28.09	0.021	5.98
1570	5000*	78.54	0.015	10.00
1580	20800	78.54	0.015	10.00

---

[1] See Unified Interceptor Model Schematic Figure 3.

[2] Irregular-shaped conduits modeled at equivalent circular sections, except as noted.

*Drop shaft length is about 290-ft. 5000-ft simulated to represent headloss.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

EXISTING CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq.ft.)	Manning's Coefficient	Simulated[2] Diameter (ft.)
East Boston Branch Sewer				
1600	200	50.27	0.015	8.00
1610	700	39.26	0.015	7.07
1620	922	19.63	0.015	5.00
1630	300	15.90	0.015	4.50
1910	820	0.79	0.015	1.00
1920	1770	1.23	0.015	1.25
1930	1410	1.77	0.015	1.50
1940	3320	8.14	0.015	3.22
1950	2100	8.14	0.015	3.22
1960	820	8.14	0.015	3.22
1970	400	12.57	0.015	4.00
North Metropolitan Trunk Sewer (Winthrop)				
1010	3478	63.62	0.021	9.00
1020	14421	63.62	0.016	9.00
1030	8165	63.62	0.016	9.00

---

(1) See Unified Interceptor Model Schematic Figure 3.

(2) Irregular-shaped conduits modeled as equivalent circular sections.

METROPOLITAN DISTRICT COMMISSION
COMBINES SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 2. CONDUIT DATA FOR THE UNIFIED INTERCEPTOR MODEL
- Continued -

PROPOSED CONDUITS

Conduit[1] Number	Length (ft.)	Area (sq.ft.)	Manning's Coefficient	Diameter (ft.)
East Side Interceptor North Branch				
4085	1410	23.76	0.015	5.50
4112	780	23.76	0.015	5.50
4118	390	23.76	0.015	5.50
4145	960	23.76	0.015	5.50
4148	1720	23.76	0.015	5.50
4155	650	38.48	0.015	7.00
4175	710	38.48	0.015	7.00
4177	1840	38.48	0.015	7.00
East Side Interceptor South Branch				
6045	390	28.27	0.015	6.00
6050	1220	28.27	0.015	6.00
6060	970	38.48	0.015	7.00
6070	960	38.48	0.015	7.00
Boston Main Interceptor Replacement				
6075	1080	50.27	0.015	8.00
6077	500	12.57	0.015	4.00
6085	730	50.27	0.015	8.00
6090	3650	50.27	0.015	8.00
5200	500	19.63	0.005	5.00
5300	500	1.77	0.005	1.50
6095	1000	50.27	0.015	8.00

[1] See Unified Interceptor Model Schematic Figure 2A.

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
UNIFIED INTERCEPTOR MODEL REPORT

TABLE 3. JUNCTION DATA FOR THE UNIFIED INTERCEPTOR MODEL

Junction Number[1]	Elevations (MDC Datum) Ground	Invert
Existing Conduit Junctions		
109	122.00	106.00
208	122.00	103.80
308	122.00	103.30
409	122.00	103.00
509	122.00	100.90
609	121.00	100.90
709	123.00	101.30
809	120.00	100.00
20009	115.90	106.60
20108	117.50	105.80
20209	118.80	104.70
30008	128.40	104.40
30308	110.60	102.50
30608	117.40	100.80
30908	117.60	99.40
31108	115.30	99.00
31408	112.50	97.40
32109	118.50	92.80
32208	103.50	95.60
32305	119.50	97.20
32408	117.20	98.60
32508	116.20	99.30
32608	105.40	100.30
32709	125.00	102.10
32808	107.70	104.80
32908	108.90	107.60
33005	117.20	87.10
33104	116.00	85.60
33200	119.00	85.60
33300	119.00	-197.00
33301	122.00	-194.00
33302	122.00	81.00
33400	120.50	-204.00
40309	120.00	101.60
40408	105.80	99.70
40608	103.70	97.60
40708	120.00	97.40
40808	104.20	97.10

[1] See unified interceptor model schematic Figure 2.

TABLE 3. JUNCTION DATA FOR THE UNIFIED INTERCEPTOR MODEL (Continued)

Junction Number[1]	Elevations (MDC Datum) Ground	Invert
41108	102.80	98.60
41408	102.80	97.50
41509	122.50	97.00
41708	121.00	95.90
41808	115.50	95.10
42108	120.00	93.60
50008	111.90	108.20
50108	110.20	106.50
50308	119.00	104.70
50408	119.00	101.70
50608	118.00	97.70
50708	103.60	97.20
50908	102.20	95.90
51008	104.20	95.00
50008	111.90	108.20
50108	110.20	106.50
50308	119.00	104.70
50408	119.00	101.70
50608	118.00	97.70
50708	103.60	97.20
50908	102.20	95.90
51008	104.20	95.00
60009	117.00	93.40
60205	117.00	100.00
60209	117.00	92.40
60308	117.00	91.30
60708	101.70	89.90

[1] See unified interceptor model schematic Figure 2.

TABLE 3.. JUNCTION DATA FOR THE UNIFIED INTERCEPTOR MODEL (Continued)

Junction Number(1)	Elevations (MDC Datum) Ground	Invert
70009	117.00	108.90
70208	106.50	102.70
70308	108.70	101.70
70408	106.10	99.90
70508	104.20	99.60
70708	105.70	98.10
70808	107.50	97.60
71008	105.00	96.20
71109	116.30	95.20
71208	104.20	88.90
71308	108.10	90.00
71509	115.00	90.60
71609	115.00	88.60
72009	116.00	92.30
72108	102.80	92.90
72209	114.00	94.20
72409	111.00	97.20
80109	110.00	91.90
80209	114.00	91.40
80408	107.70	90.10
80608	106.60	89.80
81009	114.00	83.00
81309	154.50	80.40
81509	136.00	123.40
81709	112.00	105.10
82009	125.30	102.00
82208	115.50	100.60
82309	114.00	80.00
82409	113.00	93.00
82509	121.00	94.20
10008	120.50	92.40
10109	113.30	94.80
10208	110.00	99.30
10309	119.00	103.50
11009	121.90	84.40
11109	115.60	86.10
11209	115.10	86.70
11509	117.50	90.50

(1) See unified interceptor model schematic Figure 3.

TABLE 3. JUNCTION DATA FOR THE UNIFIED INTERCEPTOR MODEL (Continued)

Junction Number[1]	Elevations (MDC Datum) Ground	Invert
11709	113.80	94.20
11808	115.30	96.80
11209	115.10	86.70
11509	117.50	90.50
11709	113.80	94.20
11808	115.30	96.80
12009	111.90	97.80
12309	112.90	99.50
12324	120.00	102.50
12409	122.50	101.00
13009	110.30	93.10
13004	116.40	96.40
13014	116.20	71.40
13108	115.60	94.50
13305	115.00	94.20
13308	115.00	94.20
13609	113.30	98.40
13709	122.50	101.80
13809	117.90	104.80
13909	115.60	100.70
15009	114.20	79.00
15109	114.00	79.00
15209	114.00	-185.00
15309	120.50	-204.00
16009	114.00	79.00
16109	114.00	78.80
16208	127.00	38.50
16309	127.00	116.00
19108	105.70	102.90
19208	116.00	102.70
19308	105.50	98.20
19408	103.80	95.00
19508	104.70	91.70
19608	118.00	89.70
19708	110.00	88.50
19709	110.00	87.00
19809	118.00	88.90
19209	116.00	103.30

[1] See unified interceptor model schematic Figure 3.

TABLE 3. JUNCTION DATA FOR THE UNIFIED INTERCEPTOR MODEL (Continued)

Junction Number[1]	Elevations (MDC Datum) Ground	Invert
Proposed Conduit Junctions		
40808	104.20	97.10
40818	117.00	96.40
41118	117.00	96.01
41208	117.00	95.82
41308	117.00	95.34
41406	118.00	92.93
41506	121.00	92.80
41706	119.00	92.66
60408	117.00	95.44
60508	116.00	94.20
60608	117.00	94.00
60708	117.00	98.70
61008	118.00	90.60
61508	115.00	90.17
62008	118.00	88.40
62010	117.00	87.20

[1] See unified interceptor model schematic Figure 2A.

APPENDIX C

REPORTS BY HALEY AND ALDRICH, INC. ON FOUNDATION REQUIREMENTS AND CONSTRUCTION PROCEDURES FOR MAJOR STRUCTURAL RECOMMENDATIONS

SOUTH BOSTON
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8 April 1980
File No. 4140

MEMORANDUM

TO: Camp, Dresser & McKee, Inc.
Attn: Mr. Steve Hickox
Mr. Victor Coletti

FROM: Haley & Aldrich, Inc.
Edward B. Kinner
Kenneth L. Recker

SUBJECT: Preliminary Geotechnical Design Criteria and Construction Considerations
MDC Combined Sewer Overflow Study
Proposed Consolidation Conduit along
Day Boulevard, South Boston, Massachusetts

I. INTRODUCTION

The proposed consolidation conduit is to be located along Day Boulevard, between existing outfall BOS-081, located at Farragut Road, and outfall BOS-087, near Columbus Circle, as shown on Figure 1, Project Locus. The southwestern 460 ft. of the alignment is located adjacent to a paved road, behind the MDC Police Station, between Day Boulevard and outfall BOS-087. The ground surface elevation along the alignment varies from El. 115 to 122 (MDC Sewers datum).

It is understood that the reinforced concrete conduit will consist of 3-ft. diameter pipe from Sta. 0+00 to 18+70, 4-ft. diameter pipe from Sta. 18+70 to 36+40, and 5-ft. diameter pipe from Sta. 36+40 to 89+80. The depth of the pipe invert varies from approximately 12 to 27 ft.

II. SUBSURFACE EXPLORATIONS

Readily available subsurface data along the proposed alignment were obtained from several sources:

- Journals of the Boston Society of Civil Engineers, "Boring Data from Greater Boston", 1969 and 1961.

- "Report on Improvements to the Boston Main Drainage System", Camp, Dresser & McKee, Inc. 1967, report for MDC.

- MDC Data for the Columbus Park Connection and Overflow Conduits.

A total of four test borings, SB-1C through SB-4, were drilled during the period 28 to 31 December 1979, at locations shown on Figure 2, for the purpose of supplementing existing subsurface data. The borings were terminated in naturally deposited inorganic soils, at depths varying from 35 to 39 ft.

In addition two test borings, SB3-1 and SB3-2, were drilled during the period 18 to 21 December 1979 to obtain subsurface data at the location of a proposed CSO storage tank in the vicinity of the MDC Police Station. The borings were drilled to depths of 79.5 and 157 ft. A groundwater observation well was installed in one of the completed borings.

Five of the December 1979 borings were 2-1/2 in. diameter standard drive sample borings. One boring was a 3-1/2 in. diameter standard drive sample boring in which 3 in. diameter thin-wall tube samples of cohesive soils were obtained by the stationary piston sampling methods. The recent borings, located as shown on Figure 2 were drilled by Guild Drilling Company, Inc., and monitored by Haley & Aldrich personnel. Locations and elevations of borings near the Police Station were determined by CDM personnel; other boring elevations were approximated by Haley and Aldrich from CSO Conduit Plan and Profile sheets provided by CDM.

III. SUBSURFACE CONDITIONS

Boring data from the past and recent borings near the alignment indicate a subsurface soil sequence consisting of five major units. A generalized profile along the alignment is presented on Figure 2. The following is the generalized soil sequence - proceeding downward from ground surface:

1. Fill
2. Organic Silt
3. Inorganic Silts and Sands
4. Clay
5. Glacial Till

Fill: As disclosed by the borings, the fill consists of varying amounts of yellow to brown, coarse to fine sand,

gravel, silt, clay, crushed stone, shells, and cinders. As disclosed by the borings the fill varies from 5 to 14 ft. in thickness. In the vicinity of boring SB-1C, three attempts were required to advance the boring through the fill due to refusals on obstructions.

Organic Silt: Soft to medium stiff, gray to black, organic silt with trace to some fine sand was encountered below the fill at many locations. The organic silt in the recent borings was found to be up to 13 ft. in thickness. In previous boring H, organic silt up to 24 ft. in thickness was encountered.

Sands: Lenses of fine sand to coarse to fine sand and gravel were encountered in borings in the general vicinity of Sta. 25+00 to 35+00, and 70+00 to 80+00. These are expected to be localized, discrete lenses deposited during periods of heavy volume or higher velocity fluvial or tidal deposition.

Clay: A deposit of soft to medium stiff, yellow to gray clay and silty clay, interbedded with fine sand in some areas, is found generally underlying the sands, organic silt or fill. As disclosed by the borings, the thickness varies from 28 to 153 ft.

Glacial Till: A 4-ft. thick layer of very compact sandy silt with little gravel, known as glacial till, was encountered in Boring SB3-2 below the clay at a depth of 153 ft. A similar material was encountered at boring H, at a depth of 60 ft. below the ground surface.

Groundwater levels recorded during January through March 1980 from the observation well installed in boring SB3-2, indicate an approximate groundwater level at El. 110. The water level along the alignment can be expected to vary with precipitation, tidal fluctuations, season, temperature, and construction activity in the area. Therefore, levels encountered during construction may not be the same as those recorded for the observation well.

IV. LABORATORY TESTING

The laboratory testing program consisted primarily of performing unconfined compression tests on Shelby tube samples of the organic silt and clay strata. The purpose of the unconfined compression tests was to determine the undrained shear strength to evaluate bottom stability for trench excavation.

Routine classification tests (Atterberg limits and natural water content) of the tube samples were also performed to assist in classification and for correlation of engineering properties.

All laboratory tests were performed in the Haley & Aldrich soils laboratory. The tests were conducted according to the latest ASTM procedures using modern soil testing equipment. Results are summarized in Table I. The undrained shear strength s_u (equal to one-half the compressive strength) of the organic silt varies from approximately 280 to 500 lbs. per sq. ft. The undrained shear strength of the clay varies from approximately 460 to 1500 lbs. per sq. ft.

V. PRELIMINARY DESIGN RECOMMENDATIONS

5-01. Support

The elevation of the proposed consolidation conduit in relation to subsurface conditions is indicated on Figure 2. It is anticipated that for the most part the invert of the conduit will be located within naturally deposited inorganic soils. The extent and limits of peat and organic soils can be expected to be quite variable and depend on former locations of tidal marshes which may have existed at specific locations along the proposed conduit alignment.

Based on available information, it is anticipated that deposits of organic silt extend up to 12 ft. below the conduit invert, in the area from Sta. 55+00 to 70+00 and from Sta. 4+00 to 10+00.

Based on the anticipated subsurface conditions, it is recommended that the conduit be soil supported for its entire length on naturally deposited inorganic soil or compacted structural fill placed after excavation of fill and organic soils. Criteria for the depth of excavation/ replacement below invert with structural fill are given below:

Pipe Diameter (Ft.)	Recommended Depth of Excavation/Replacement of Fill and Organic Soils (Ft.)
5	4
4	3
3	3

Along portions of the conduit where more than 5 ft. of compressible organic soils are left in place below the excavation level, it is recommended that lightweight granular fill be used as backfill. Based on preliminary analysis, it is anticipated that the use of lightweight fill will limit post construction settlements to approximately 2 in.

Voids in fill materials, if encountered at the excavation level, should be thoroughly choked with structural fill or pea stone prior to placement of structural fill for support.

Based on the anticipated subsurface conditions, the following subgrade soils are anticipated at the invert level of the pipe:

Material	Approximate Limits (See Figure 2)
Organic Soil	• Sta 4+00 to 12+00 • Sta 55+00 to 70+00
Sand and Gravel	• Sta 0+00 to 4+00 • Sta 12+00 to 35+00
Clay	• Sta 35+00 to 55+00 • Sta 70+00 to 89+00

5-02. Bedding

In areas where fine-grained subgrade soils, such as inorganic silt and clay, are encountered at the final level of excavation, it is recommended that a minimum 6-inch thick layer of concrete sand, graded in accordance with ASTM Test Designation C33 for Fine Aggregate, be placed between the subgrade and the gravel or stone bedding material. This sand will serve as a filter layer to prevent loss of ground below the pipe due to movement of the fine-grained soil into the gravel or stone. In those areas where the pipe bears on a pad of structural fill, these filter requirements may be waived.

5-03. Backfill

Since the proposed conduit alignment is located almost entirely within streets, special recommendations pertaining to the backfilling of trenches are in order. It is our recommendation that trenches be backfilled as follows:

1. From mid-height of the pipe to one foot above the pipe, common fill having a maximum particle size of two inches should be used. It is assumed that bedding materials are carried up to mid-height of the pipe.

2. The zone from one foot above the pipe to two feet below final grade should be filled with common fill.

3. The final two feet up to final grade should be filled with structural fill.

Common fill should consist of predominantly granular inorganic soil substantially free of organic materials, loam, wood, trash, and other objectionable material which may be compressible or which cannot be properly compacted. Maximum particle size is 10 inches, except as recommended above. Common fill should be placed in uniform, approximately horizontal layers, not to exceed 10 inches, measured before compaction. Each layer should be thoroughly compacted to at least 92 percent maximum dry density. Settling of the backfill with water should not be permitted.

Structural fill should consist of clean gravel, sandy gravel, or gravelly sand free from roots, loam, rubbish, frozen soils, and other deleterious materials. It should be well graded within the following limits:

Sieve Size	Percent Finer by Weight
6 inch	100
No. 4	30 - 95
No. 40	5 - 15
No. 200	0 - 8

When placed below the pipe as a bearing pad, the structural fill should be placed in 12 inch layers or as necessary to properly compact it to at least 92 percent of the maximum dry density. When placed within two feet of final grade, the loose lift thickness should be reduced to 6 inches and percent compaction increased to at least 95 percent.

Lightweight granular fill should consist of clean sand, free of roots, loam, rubbish, and other deleterious organic material. It should be free of frozen material and graded in accordance with ASTM Designation D1073, Grading No. 2, for Fine Aggregate for Bituminous Paving Mixtures. This fill should be placed in layers not to exceed 12 inches, measured prior to compaction and should be compacted to at least 92 percent of the maximum laboratory dry density.

It is recommended that all clay and organic soils excavated from the trenches be wasted. It is our opinion that these materials will be largely unworkable and unsuitable for use as trench backfill.

VI. CONSTRUCTION CONSIDERATIONS

6-01. General

The primary purpose of this section of the report is to comment on items related to excavation, dewatering, lateral support, earthwork and related geotechnical aspects of the proposed construction. It is written primarily for the engineer having responsibility for preliminary design and cost estimating.

6-02. Trench Excavation

In general, for preliminary cost estimates, it is recommended that a braced sheeted excavation be assumed for trench excavation. It is our opinion that open excavation or the use of a trench box will not provide adequate support for adjacent structures, property, utilities and roads. An open excavation may be assumed for locations where there is sufficient space for stable side slopes (slopes no steeper than 1 horizontal to 1 vertical) and unsuitable soils requiring over-excavation are not present.

For preliminary cost estimates it may be assumed that in areas where naturally deposited granular inorganic soils are present below the excavation level, the sheeting penetration below the excavation will be equal to one-half of the excavation depth or 10 ft. whichever is less. In areas where organic soils or soft clay are present below the excavation level, the sheeting penetration below the excavation should be assumed equal to one-half the depth of excavation or 10 ft. whichever is greater. Therefore, it should be assumed that 20 to 38 ft. long sheeting will be required. It is our opinion that with sufficient sheeting penetration, the excavation can generally proceed with seepage control provided by sumps and open pumping. Excavation to final grade and all foundation construction should be conducted in-the-dry.

In order not to disturb bedding material, all sheeting should be cut off at or above mid-height of the pipe prior to pulling. Timber sheeting above mid-height of the pipe should be removed, but steel sheeting may be left in place. If left in place, steel sheeting should be cut off at least 2 ft. below final grade.

VII. CLOSURE

The evaluations and recommendations presented herein are based on preliminary subsurface information and the proposed construction. Due to unknowns resulting from the limited amount of subsurface information, these recommendations are intended for preliminary design only.

Unknown factors apparent at this time include detailed subsurface conditions, the depths to suitable bearing soils, engineering properties of the subsurface soils and the nature of fill materials as regards obstructions and dewatering characteristics.

Subsurface explorations will be required during final design to determine these unknown factors. Should differing conditions become evident during final design, these recommendations should be reviewed to confirm continued applicability.

NOAA FORM 4 FED. 74

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO 4140

SHEET 1 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ. FT.	C_c	
SB1C/T1	Gray silty CLAY with fine sand pockets and partings, trace gravel	35 - 37					(119.1)					
		35.5		35.3								TV = 0.28 PP = 1.1 SV = 0.46 R = 0.2
		35.7	UC14	38.2			111.3	2150	8.8			
		36.2	L8	34.4	48.4	22.7						PP = 1.9 SV = 0.76 R = 0.24
		36.6	UC15	33.7			116.6	2810	11.2			
		36.9		33.4								TV = 0.72 PP = 1.5 SV = 0.70 R = 0.24
SB2/T1	Gray silty CLAY, few fine sand partings	34 - 36					(119.7)					
		34.3	L9	38.1	48.0	28.3						
		34.7	U16	34.5			115.2	2130	12.0			
		34.9		36.1								TV = 0.79 PP = 1.25 SV = 0.9 R = 0.13
		35.3		34.7								
		35.6	UC17	33.8			115.0	3030	12.4			TV = 0.68 PP = 1.25 SV = 0.78 R = 0.11
		35.8		33.5								TV = 0.90 PP = 1.6 SV = 1.0 R = 0.18

HALEY & ALDRICH, INC.

TABLE I

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO. 4140

SHEET 2 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ.FT.	C_c	
SB3/T1	Gray-brown mottled silty CLAY	35 - 37					(117.7)					
		36.4		38.1								SV = 0.17 PP = 0.2 SV = 0.19 R = 0.03
		36.7	UC18	33.5			116.0	920	14.3			
		36.9	L10	32.4	44.3	21.1						TV = 0.93 PP = 1.75 SV = 0.9 R = 0.09
SB4/T1	Dark gray ORGANIC CLAY, with fine sand partings, shells at 15.8 ft.	14 - 16					(105.1)					
		14.3		53.9								TV = 0.2 PP = 0.25 SV = 0.18 R = 0.03
		14.6	UC19	50.6			105.3	570	7.2			
		15.1		53.1								TV = 0.2 PP = 0.4 SV = 0.34 R = 0.07
		15.3	UC20	49.8			100.3	990	8.8			
		15.6		57.5								TV = 0.23 PP = 0.4 SV = 0.26 R = 0.04

NAA FORM · FEB. 74

HALEY & ALDRICH, INC

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO. 4140

SHEET 3 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ.FT.	C_c	
SB4/T2	Gray silty CLAY with fine sand partings	29 - 31					(119.4)					
		29.3		29.1								TV = 0.3 PP = 1.25 SV = 0.46 R = 0.02
		29.6	UC21	31.6			116.2	1690	10.4			
		30.1	L11	36.6	53.4	22.2						TV = 0.7 PP = 1.5 SV = 0.78 R = 0.08
		30.4	UC22	36.1			113.4	1830	13.2			
		30.8		36.6								TV = 0.6 PP = 1.25 SV = 0.8 R = 0.18

NOTES:

TV = Shear strength in TSF as measured by Torvane, manufactured by Soiltest.
SV = Shear strength in TSF as measured by LabVane, manufactured by Geonor.
R = Remolded shear strength in TSF as measured by LabVane, manufactured by Geonor.
PP = Compressive strength in TSF as measured by Pocket Penetrometer, manufactured by Soiltest.
( ) = Unit weight of entire tube sample.
T = 2-inch diameter Shelby tube.
U = 3-inch diameter tube by stationary piston method.

TABLE I

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

N

PROJECT LOCUS

U.S.G.S. QUADRANGLE

BOSTON SOUTH, MA

APPROX. SCALE: 1"= 2000'

FILE NO. 4140 A5

FIGURE 1

APPENDIX A

LOGS OF TEST BORINGS
Prepared by
Guild Drilling Co., Inc.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1
DATE
HOLE NO. SB1-C
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 8' after 1/4 Hours
No Casing
At ____ after ____ Hours

Rods-"AW"	CASING	SAMPLER	CORE BAR.
Type	BW	S/S	
Size I.D.	2½"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/31/79	a.m. p.m.
COMPLETE	12/31/79	a.m. p.m.
TOTAL HRS.		

BORING FOREMAN C. Koehler
INSPECTOR J. Hight
SOILS ENGR.

LOCATION OF BORING: Moved 5'6" South of Original Location - Could not get past 3'8" - 3 Probes

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
	9							6"	Black Top			
	17	6"-2'	D	22	17	12	Dry medium dense	2'	Brown Sand & Gravel - FILL	1	18"	12"
	12											
	16								(Samples 1 & 2 from SB1A)			
	17											
	6	5'-6'6"	D	1	1	2				-	18'	0"
	4								Brown Sand, Gravel, Silt & Clay - FILL			
	5	6'6"-8'	D	3	4	5	Moist loose			2	18'	12"
	4											
	4						Wet/m dense					
	3	10'-11'	D	3	23			11'		3A	12'	9"
	27	11'-11'6"	D			13	"		Brown Black Sand, Gravel & Silt - FILL	3B	6"	2"
	46											
	39							14'				
	9											
	9	15'-16'6"	D	10	16	11	Wet/v stiff		Yellow CLAY with trace of fine sand layers, trace of fine gravel	4	18'	2"
	8											
	4											
	3											
	4						Wet					
		20'-20'6"	D	13			stiff	20'6"	" & fine Sand Layers	5A	6"	6"
		20'6"-21'6"	D		5	10	"		Gray CLAY varved with trace of very fine sand layers	5B	12'	9"
		25'-26'6"	D	7	10	12	Wet/v stiff			6	18'	18"
								27'				
		30'-31'6"	D	3	6	5	Wet stiff		Gray CLAY	7	18'	18"
		35'-37'	ST	P	R	E	S	S		ST1	24'	21"
		37'-38'6"	D	3	4	6	"			8	18'	16"
								38'6"				
									Bottom of Boring 38'6"			

GROUND SURFACE TO 20' USED BW "CASING: THEN Washed & Sampled

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 38'6"
Rock Coring
Samples 8

HOLE NO. SB1-C

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1
DATE
HOLE NO. SB-2
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 11'6" after 0 Hours
34' Casing
At _____ after _____ Hours

Rods-"NW"	CASING	SAMPLER	CORE BAR.
Type	NW	S/S	
Size i.D.	3"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/31/79	a.m. p.m.
COMPLETE	12/31/79	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	G.Brouillette	
INSPECTOR	J. Hight	
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
								6"	Black Top & Crushed Stone			
	22	1'-2'6"	D	19	17	17	Wet dense		Light Brown to Yellow Sand, Clay, Silt & Crushed Stone - FILL	1	18"	16"
	36											
	24											
	8	4'-5'6"	D	6	7	6	Wet/m dense			2	18"	4"
	11											
	12											
	13											
	35							8'6"				
	20	9'-10'6"	D	20	34	35	Wet very dense		Yellow Brown fine to coarse SAND & fine Gravel, trace silt	3	18"	14"
	42											
	38							12'6"				
	37											
	27											
	25	14'-16'	ST						Yellow CLAY	-	24"	0"
	25											
	20											
	21											
	19							19'6"				
	20	19'-21'	ST							-	24"	6"
	22											
	23	21'-22'6"	D	6	10	21	Wet dense	23'	Brown & Rusty Brown silty fine SAND (compact)	4	18"	18"
	33											
	34											
	34	24'-25'6"	D	4	4	5	Wet stiff		Gray CLAY	5	18"	18"
	32											
	30											
	30											
	31							29'6"				
	50	29'-31'	ST							-	24"	12"
	75						Wet/m dense		Gray fine SAND varved with Clay Layers			
	80	31'-32'6"	D	5	8	8		32'4"		6	18"	18"
	75											
	75											
		34'-36'	ST						Gray CLAY	ST1	24"	24"
							Wet stiff					
		36'-37'6"	D	3	4	5		37'6"		7	18"	18"
									Bottom of Boring 37'6"			

GROUND SURFACE TO 34' USED NW "CASING: THEN

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 37'6"
Rock Coring
Samples 7

HOLE NO SB-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.

REPORT SENT TO above / Bay Area | PROJ. NO.

SAMPLES SENT TO " | OUR JOB NO. 80-208

DATE

HOLE NO. SB-3

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At 7'2" after 1/2 Hours

No Casing

At ____ after ____ Hours

Rods-"AW"	CASING	SAMPLER	CORE BAR.
Type	BW	S/S	
Size I.D.	2½"	1 3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/28/79	a.m. p.m.
COMPLETE	12/28/79	a.m. p.m.

TOTAL HRS.

BORING FOREMAN C. Koehler

INSPECTOR J. Hight

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, grodation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec
	14							6"	Black Top			
	26	6"-2'	D	56	45	22	Dry/v dense	2'	Brown Sand & Gravel - FILL	1	18"	4"
	9											
	5											
	6											
	6	5'-6'6"	D	2	3	2	Moist loose		Brown Sand, Gravel, Shells, Clay & Silt FILL	2	18'	3"
	7											
	8											
	7											
	8							10'				
	12	10'-11'6"	D	1	2	1	"		Gray Organic SILT, trace of sand, shells & clay	3	18'	17"
	14											
	17											
	17											
	17						Wet					
		15'-16'	D	1	2		loose	16'		4A	12'	11"
		16'-16'6"	D			3	W/soft	17'	Yellow CLAY & Organic Silt	4B	6"	6"
									Gray fine sandy Organic			
							"	20'6"	SILT & Shells	5A	6"	4"
		20'-20'6"	D	4								
		20'6"-21'6"	D		10	14	Wet		Yellow, Blue & Gray CLAY	5B	12"	12"
							very		varved with trace of			
							stiff		very fine sand layers			
								25'				
		25'-26'6"	D	7	8	11	"		Yellow Blue CLAY	6	18'	18"
		30'-31'6"	D	6	7	10	"			7	18'	18"
		35'-37'	ST	P	R	E	S	S		ST1	24'	15"
								37'				
		37'-38'6"	D	5	6	6	Wet stiff	38'6"	Blue CLAY	8	18'	18"
									Bottom of Boring 38'6"			

GROUND SURFACE TO 15' USED BW "CASING: THEN Washed & Sampled

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY
Earth Boring 38'6"
Rock Coring ____
Samples 8

HOLE NO SB-3

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1
DATE
HOLE NO. SB-4
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 10'6" after 0 Hours
24' Casing
At _____ after _____ Hours

Rods-"NW"	CASING	SAMPLER	CORE BAR.
Type	NW	S/S	
Size I D.	3"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/28/79	a.m. p.m.
COMPLETE	12/28/79	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	G.Brouillette	
INSPECTOR	J. Hight	
SOILS ENGR.		

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
								6"	Black Top & Crush Stone			
	35	1'-2'6"	D	35	46	21	Wet/v dense		Brown to Black Sand, Cinder & Gravel - FILL	1	18"	12"
	40											
	25											
	12	4'-5'6"	D	10	4	3				-	18"	0"
	8											
	3											
	4	6'6"-8'	D	1	1	1				-	18"	0"
	11	8'-9'	D	3	8					-	12"	0"
	12	9'-11'	Shelby Tube							-	24"	0"
	8						Wet					
	5	11'-12'6"	D	1	1	1	loose	12'		2	18"	8"
	6								Gray SILT, some organic & clay changing to Gray Org.			
	10											
	8	14'-16'	Shelby Tube					15'	CLAY, some silt at 13'	ST1	24"	24"
	9						Wet		Brown fine sandy Organic			
	11	16'-17'	D	4	6		stiff	17'	SILT	3	12"	12"
	12	17'-17'6"	D			6	Wet		Gray F SAND & Silt, tr.clay	3A	6"	6"
	21						loose	19'	& F gravel (org. odor noted)			
	15	19'-20'6"	D	8	11	14	Wet/m		Gray fine silty SAND,	4	18"	16"
	35						dense		trace of fine to coarse			
	43							22'	gravel, clay			
	48											
	52											
		24'-25'6"	D	5	7	6	Moist stiff		Yellow Gray CLAY	5	18"	18"
		29'-31'	Shelby Tube						Gray CLAY	ST2	24"	24"
		34'-35'6"	D	3	4	5	Wet stiff	35'6"	" "	6	18"	18"
									Bottom of Boring 35'6"			

GROUND SURFACE TO 24' USED NW "CASING: THEN Open to 35'6"

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturced Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 35'6"
Rock Coring
Samples 6

HOLE NO SB-4

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 2
DATE
HOLE NO. SB3-1
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 15' @ Comp. after Hours
At after Hours

Rods-"NW"	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	
Size I.D.	4"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/19/79	o.m. p.m.
COMPLETE	12/21/79	o.m. p.m.

TOTAL HRS.
BORING FOREMAN G. Brouillette
INSPECTOR M. Jones
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, grodotion, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
	10	0'-1'6"	D	6	5	12	Moist	8"	Dark Brown TOPSOIL	1	18"	16"
	11						medium		Brown fine to medium SAND			
	21						dense	3'	& Gravel - FILL			
	7											
	7	4'-5'6"	D	2	5	2	Wet		Gray Brown silty fine SAND	2	18"	12"
	14						loose					
	15											
	19							8'				
	16											
	18	9'-10'6"	D	1	1	1	Wet		Gray Yellow Blue CLAY,	3	18"	12"
	16						soft		trace of shells & fine			
	14	10'6"-12'	D	1	1	1			sand	4	18"	12"
	17											
	17											
		14'-15'6"	D	1	1	1	"			5	18"	9"
								16'6"				
		16'6"-18'4"	UP						Gray Organic SILT	UP1	22"	22"
								18'6"	with Shells			
		19'-20'6"	D	12	21	24	Wet		Gray to Yellow CLAY with	6	18"	18"
							Hard		fine Sand Layers			
								24'8"				
		24'-25'10"	UP							UP2	22"	19"
		29'-30'6"	D	2	5	5	Wet		Gray CLAY	7	18"	18"
							stiff					
		34'-35'6"	D	2	4	5	"			8	18"	18"
		@ 36'	UP							0	0	0
							Wet/m					
		39'-40'6"	D	2	3	4	stiff			9	18"	18"

GROUND SURFACE TO 20' USED HW "CASING: THEN Open to Bottom

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
troce 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 79'6"
Rock Coring
Samples 15

HOLE NO. SB3-1

TOWN PRESS - EAST. PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 2 OF 2

TO _____ | ADDRESS _____

PROJECT NAME _____ | LOCATION _____

REPORT SENT TO _____ | PROJ. NO. _____

SAMPLES SENT TO _____ | OUR JOB NO. 80-208

DATE _____

HOLE NO. SB3-1

LINE & STA. _____

OFFSET _____

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I.D.			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN _____

INSPECTOR _____

SOILS ENGR. _____

LOCATION OF BORING _____

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, grodation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
		43'6"-45'6"	UP						Gray CLAY	UP3	24"	22"
		49'-50'6"	D	2	3	4	Wet medium stiff			10	18"	18"
		51'-52'4"	UP						(51'- 1" Sand Layer)	UP4	16"	16"
		54'-55'6"	D	1	2	3	"			11	18"	18"
		59'-60'6"	D	2	3	4	"			12	18"	18"
		64'-65'6"	D	2	3	4	"			13	18"	18"
		69'-70'6"	D	2	4	4	"			14	18"	18"
		76'-78'	UP							UP5	24"	24"
		78'-79'6"	D	1	1	2	Wet soft	79'6"		15	18"	18"
									Bottom of Boring 79'6"			

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace 0 to 10%

little 10 to 20%

some 20 to 35%

and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density: 0-10 Loose; 10-30 Med. Dense; 30-50 Dense; 50 + Very Dense

Cohesive Consistency: 0-4 Soft; 4-8 M/Stiff; 8-15 Stiff; 15-30 V-Stiff; 30 + Hard

SUMMARY

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO SB3-1

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 4

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.

REPORT SENT TO above / Bay Area | PROJ. NO.

SAMPLES SENT TO " | OUR JOB NO. 80-208

DATE

HOLE NO. SB3-2

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At 15'6" after 1/4 Hours

22' Casing

At _____ after _____ Hours

Rods-"AW"	CASING	SAMPLER	CORE BAR.
Type	BW	S/S	
Size I D.	2½"	1 3/8"	
Hammer Wt	300#	140#	
Hammer Fall	24"	30"	BIT

	Date	Time
START	12/18/79	a.m. p.m.
COMPLETE	12/21/79	a.m. p.m.

TOTAL HRS.

BORING FOREMAN C. Koehler

INSPECTOR M. Jones

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, grodation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
	4	0'-1'6"	D	1	3	5	Moist loose		9" Clayey Topsoil - Dark Brown Ash, Sand & Gravel FILL	1	18"	10"
	4											
	3											
	5											
	6							5'6"				
	1	5'-6'6"	D	2	1	1	Wet soft		Gray silty fine SAND (slightly organic)	2	18"	11"
	1											
	1											
	1							9'				
	1	9'6"-11'6"	ST	P R E S S						ST1	24"	24"
	1											
	1											
	1	11'6"-13'	D	1	½	½	Wet soft		Gray fine sandy Organic SILT	3	18"	18"
	1											
	1											
	1	15'-16'6"	D	3	1	1	"			4	18"	2"
	1											
	1											
	2						Moist	19'	Gray Clayey SILT, little			
	4	19'-20'	D	9	4		stiff	20'	fine sand	5A		
	12	20'-20'6"	D			10	M/loose	20'6"	Yellow Brown fine silty	5B	18"	14"
	14						Moist		SAND & Gray Clay Lenses			
		20'6"-22'	D	17	19	22	Hard		Yellow silty CLAY (mottled)	6	18"	13"
		22'-24'	ST	PRESS 10"		3/2"				ST2	24"	18"
				6/6"	5/6"	(300#)						
		25'-26'6"	D	4	5	7	Wet stiff			7	18"	18"
								28'				
							Wet					
		30'-31'6"	D	2	3	4	medium stiff		Blue CLAY, trace of very fine sand lenses	8	18"	16"
		34'-36'	ST	P R E S S						ST3	24"	24"
		36'-37'6"	D	2	2	3	"			9	18"	18"

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 157'
Rock Coring
Samples 33

HOLE NO SB3-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I.

SHEET 2 OF 4
DATE
HOLE NO. SB3-2
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO.
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR
Type			
Size I D.			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		40'-41'6"	D	1	1	2	Wet soft		Blue CLAY, trace of very fine sand lenses	10	18"	18"
		45'-46'6"	D	1	3	3	Wet medium stiff			11	18"	18"
		47'-49'	ST	P R	E S S					ST4	24"	24"
		50'-51'6"	D	1	2	2	Wet soft			12	18"	18"
		55'-56'6"	D	1	2	1	"			13	18"	18"
		62'-63'6"	D	2	2	2	"			14	18"	18"
		65'-66'6"	D	1	1	2	"			15	18"	18"
		70'-71'6"	D	1	1	1	"			16	18"	18"
		75'-76'6"	D	1	1	1	"			17	18"	18"

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturced Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D. Samoler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO SB3-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 3 OF 4
DATE
HOLE NO. SB3-2
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO.
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At _____ after _____ Hours
At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I.D.			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		
BORING FOREMAN		
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
		80'-81'6"	D	1	1	1	Wet soft		Blue CLAY, trace of very fine sand lenses	18	18"	18"
		85'-86'6"	D	1	1	1	"			19	18"	18"
		90'-91'6"	D	1	1	1	"			20	18"	18"
		95'-96'6"	D	1	2	2	"			21	18"	18"
		100'-101'6"	D	2	3	2	Wet medium stiff			22	18"	18"
		105'-106'6"	D	2	4	3	"			23	18"	18"
		110'-111'6"	D	1	1	1	Wet soft			24	18"	18"
		115'-116'6"	D	1	1	1	"			25	18"	18"

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring _____
Rock Coring _____
Samples _____

HOLE NO SB3-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 4 OF 4
DATE
HOLE NO. SB3-2
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO.
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At ____ after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I.D.			
Hammer Wt.			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
		120'-121'6"	D	1	1	1	Wet soft		Blue CLAY, trace of very fine sand lenses	26	18"	18"
		125'-126'6"	D	1	1	1	"			27	18"	18"
		130'-131'6"	D	Wt.	of Rods		"			28	18"	18"
		135'-136'6"	D	1	1	1	"			29	18"	18"
		140'-141'6"	D	Wt.	Rods	6	Wet medium stiff	145'		30	18"	18"
		145'-146'6"	D	12	17	14	Wet dense	148'	Gray silty fine SAND, trace of clay	31	18"	12"
		150'-151'6"	D	1	2	2	Wet soft	153'	Gray CLAY varved with little very fine sand	32	18"	17"
		155'-157'	D	66 100/3"	60	61 150/3"	Moist very dense	157'	Gray sandy SILT, little gravel Gray Purple weathered ARGILLITE	33	24"	18"
		@ 157'	D	50/0" (300#)			Well Point at of P Stone -		Refusal-Bottom of Boring 157' 20' with Gate Box - 4 Bags 1/2 Bag of Ottowa Sand			

GROUND SURFACE TO ____ USED ____ "CASING: THEN ____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring ____
Rock Coring ____
Samples ____

HOLE NO SB3-2

TOWN PRESS - EAST PROV.

SOUTH BOSTON
STORAGE/CONTAINMENT FACILITY

HALEY & ALDRICH, INC.
238 MAIN STREET · CAMBRIDGE · MASSACHUSETTS 02142
617/492-6460

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EDWARD B. KINNER
DOUGLAS G. GIFFORD
JOSEPH J. RIXNER
ALLEN W. HATHEWAY
GARY S. BRIERLEY
RICHARD P. STULGIS

24 April 1980
File No. 4140

MEMORANDUM

TO: Camp, Dresser & McKee, Inc.
Attention: Mr. Steve Hickox
Mr. Victor Coletti

FROM: Haley & Aldrich, Inc.
Edward B. Kinner
Kenneth L. Recker
Cetin Soydemir

SUBJECT: MDC Combined Sewer Overflow Study
Proposed Storage/Containment Facility
South Boston, Massachusetts

I. INTRODUCTION

The proposed storage/containment facility is to be located in MDC Parkland at Carson Beach, approximately 40 feet northeast of the MDC Police Station (Old Colony Division), approaching as near as 20 feet to William Day Boulevard at its western corner and about 300 feet from the beach line, in South Boston, Massachusetts (see Figure 1, Project Locus and Figure 2). The site is approximately level, with an average ground surface at El. 117 (MDC Sewers Datum).

It is understood that the proposed storage and containment facility will consist of a major underground storage tank and a control unit rising above ground and connected to the tank at its southwestern corner. The proposed 84-inch diameter consolidation conduit connects to the control unit at an invert El. 92.2. The facility structures have the following proposed design characteristics:

a. Storage tank:

- Plan dimensions: 130 ft. by 236 ft.
- Floor slab (top): El. 79.0
- Roof slab (top): El. 102.50, indicating that there will be an earth cover of about 16 ft. thickness above the roof slab.

b. Control unit:

- Plan dimensions: 35 ft. by 40 ft.
- Floor slab (top):
  - Pump room: El. 77.0
  - Channel room: El. 92.2
  - Screen room: El. 109.2
  - Top room: El. 120.0

II. SUBSURFACE EXPLORATIONS

Two test borings, denoted as SB3-1 and SB3-2, were drilled at the locations shown on Figure 2, during the period of 18 to 22 December 1979, to obtain preliminary subsurface information. Boring SB3-1 was drilled to a depth of 79.5 ft., terminating in naturally deposited inorganic clay. Boring SB3-2 was drilled to a depth of 157 ft., and was terminated in bedrock.

Boring SB3-1 was 4-inch diameter from which 3-inch diameter thin walled "undisturbed" tube samples were obtained. Boring SB3-2 was a 2-1/2-inch diameter standard drive sample boring. The test borings were drilled by Guild Drilling Company, Inc., of East Providence, Rhode Island and monitored by Haley & Aldrich personnel. Boring locations and ground surface elevations were established by CDM personnel. The Contractor's boring logs are included in Appendix A.

III. SUBSURFACE CONDITIONS

The subsurface explorations revealed the following generalized soil sequence, beginning at ground surface and extending downward:

1. Fill
2. Sandy Organic Silt
3. Clay
4. Glacial Till
5. Bedrock

Fill: A layer of miscellaneous fill consisting of loose to medium dense, fine to medium sand with varying amounts of silt, loam and gravel covers the site. The fill thickness encountered in the borings ranged from 3 to 6 ft.

Sandy Organic Silt/Silty Sand: An approximately 20-ft. thick stratum of fine sandy, clayey, organic silt underlies the fill. As disclosed by the borings, the stratum is quite non-uniform with fine sand, organic silt or clay being the dominant component depending on location and depth. Shells are present, particularly where organic silt is present.

Clay: A thick deposit of soft to medium stiff, gray to blue clay with trace of fine sand lenses underlies the organic soils. Boring SB3-2 disclosed the clay stratum to be about 135 ft. thick.

Glacial Till: A very compact, gray sandy silt with little gravel,about 4 ft. in thickness, underlies the thick clay stratum at SB3-2 and is believed to blanket the bedrock.

Bedrock: Gray to purple weathered argillite was encountered at a depth of about 155 ft. in SB3-2. The top two to three feet of the bedrock was observed to be decomposed and relatively soft in consistency.

Groundwater observation well, OW3-2, installed at the location of Boring SB3-2 revealed that groundwater varied from approximately El. 108.3 to El. 109.1 during January and February 1980. On 13 March 1980, with the site flooded on the ocean side of the well, the groundwater level was measured at El. 109.9. The water level at the site can be expected to vary with tidal activity, precipitation, season, temperature and construction activity in the area. Therefore, levels to be encountered during construction may not be the same as those recorded for the observation well. The installation record and the observed data for the well are included in Appendix B.

IV. LABORATORY TESTING

Unconfined compression tests were performed to obtain data on the undrained shear strength of the clay stratum for use in evaluating bottom stability of the tank excavation. In addition, two consolidation tests were performed on undisturbed soil samples to determine the compressibility/swelling characteristics of the upper segment of the clay stratum and the overlying organic silt.

Routine classification tests (Atterberg limits, natural water contents and unit weights) were also performed to assist in soil identification and for correlation of engineering properties.

All laboratory tests were performed in the Haley & Aldrich laboratory. The tests were conducted according to the latest ASTM procedures using modern soil testing equipment. Results of the tests are summarized in Appendix C.

V. PRELIMINARY DESIGN RECOMMENDATIONS

It is our understanding that the top of floor slab for the storage tank is to be at El. 79 and that the top of floor slab for the control unit is to be at El. 77. A 4-ft. thick reinforced concrete mat is proposed for the tank unit. Accordingly, the structure will bear at El. 75 (±) within the relatively stiffer, overconsolidated upper segment of the clay stratum.

Since the construction of the proposed structure requires approximately a 44-ft. deep excavation, there will be an unloading of about 5,000 lbs. per sq. ft. We understand that the tank unit in service is to weigh 38,000 tons, or approximately 2,500 lbs. per sq. ft. Upon the completion of the structure, approximately a 16-ft. thickness of fill will be placed over the tank unit with the final site grade being at El. 118. The cover fill will exert loading of about 1,850 lbs. per sq. ft. Thus, the final total loading at El. 75 will be 10 to 15 percent less than that prior to excavation.

It is recommended that the structure be directly soil supported. A working mat of granular fill overlain by 6 to 12 inches of lean concrete fill should be used as a working surface below the foundation mat. Post-construction heaving of the unit due to swelling of the clay is expected to be less than 1/2 inch.

Since both the tank and control unit will extend below groundwater, it is recommended that they be designed to resist hydrostatic uplift pressures. We recommend that the design groundwater level be El. 115. The total resistance to hydrostatic uplift may be estimated by using 1) the dead weight of the completed structure; 2) the total weight of soil and water overlying the tank roof and any portion of the base slab; and 3) the resistance mobilized on a vertical surface that extends from the base slab level to the ground surface along the perimeter of the structure. The total unit weight of soil and water lying vertically above the roof and foundation should be assumed to be 115 lbs. per cu. ft. The magnitude of available perimeter resistance will depend on the final design and construction details selected and the soil data obtained during final design.

The factor of safety against uplift, calculated as the ratio of total resisting force to total hydrostatic uplift on the base slab, should equal or exceed 1.25. Our preliminary evaluation indicates that adequate resistance can be provided by a combination of the dead weight of the structure and overlying earth fill. All recommendations for resistance to hydrostatic uplift forces assume that adequate dewatering is conducted to avoid floatation during construction.

Below grade exterior walls should be designed to resist lateral forces calculated using an equivalent fluid unit weight of 95 lbs. per cu. ft. In addition, it is recommended that the exterior walls below grade be designed to resist earthquake forces calculated in accordance with Section 716.6.10 of the Massachusetts State Building Code.

It is our opinion that the site should be considered a Class B site in accordance with the seismic provisions of the Massachusetts Building Code. If calculation of lateral seismic forces is required for design, a soil factor of S = 1.5 should be used. The subsoils at the site are not considered susceptible to liquefaction.

It is recommended that special attention be given to the pipe line connections to the structure. Flexible connections should be provided since there may be some tendency for differential movements between the tank-control unit and the pipes.

A. General

The purpose of this section is to propose alternative feasible schemes for the proposed construction, incorporating items related to excavation, dewatering, lateral support and other pertinent geotechnical factors. It is written primarily for the engineer having responsibility of preliminary design and cost estimating.

From a geotechnical standpoint, the most critical aspect of the construction is making the excavation for the structure. The required total excavation will be approximately 130 ft. by 236 ft. in plan and extend to a depth of about 44 ft. A thick clay stratum of medium stiff to soft consistency underlies the excavation, thus making the bottom stability of the excavation a major consideration. This is essentially a

reverse bearing capacity problem. The soils to the sides of the excavation provide a surcharge tending to cause shear failure of the soils below the excavation depth and heave into the excavation. In the literature, this is known as "heave of bottom of cuts in soft clay."

The undrained shear strength of the clay is the key soil parameter controlling bottom stability. Only very limited undrained shear strength data are available at the site as noted in Appendix C. To supplement these data, a review was made of a large number of strength tests performed by Haley & Aldrich, Inc. on clay samples recovered at University of Massachusetts at Columbia Point campus. For preliminary evaluations, it is our opinion that a reasonable estimate of the undrained shear strength is in the range of 800 to 1200 lbs per sq. ft. Construction procedures to maintain adequate safety relative to bottom stability have been evaluated for these assumed limiting strengths as described below. The illustrations provided serve to outline the types of special procedures that may be necessary at this site to construct the facility. The final procedures selected must be based on a comprehensive evaluation of the strength of the clay stratum during final design.

B. Construction Schemes (A) and (AA)

Both schemes include pre-stripping of the site, installation of interlocking steel sheet piling and staged excavation with appropriate internal cross bracing as illustrated in Figures 3 and 4. Figure 3 is for the assumed upper bound (1,200 lbs. per sq. ft.) of undrained shear strength and Figure 4 for the lower bound (800 lbs. per sq. ft.). With both schemes, it is believed that groundwater can be controlled by ditching and open sump pumping following installation of the sheet piling.

In order to avoid settlements of the structure, it may be necessary to leave the sheet piling in place below the foundation mat. This will require further evaluation during final design.

C. Construction Scheme (B)

Scheme B includes prestripping of the site, installation of permanent structural walls with slurry wall techniques, and staged excavation with appropriate internal cross bracing as illustrated in Figure 5. The scheme is valid for both

assumed undrained shear strengths, although a greater depth of prestripping is required for the lower strength, as noted in the figure. For the 1200 lbs. per sq. ft. case, it should be noted that the site is being stripped to a lower grade (El. 105) then the El. 110 level for the corresponding strength in Scheme A. This was done to bring the top elevation of the slurry walls to approximately the roof level of the tank structure.

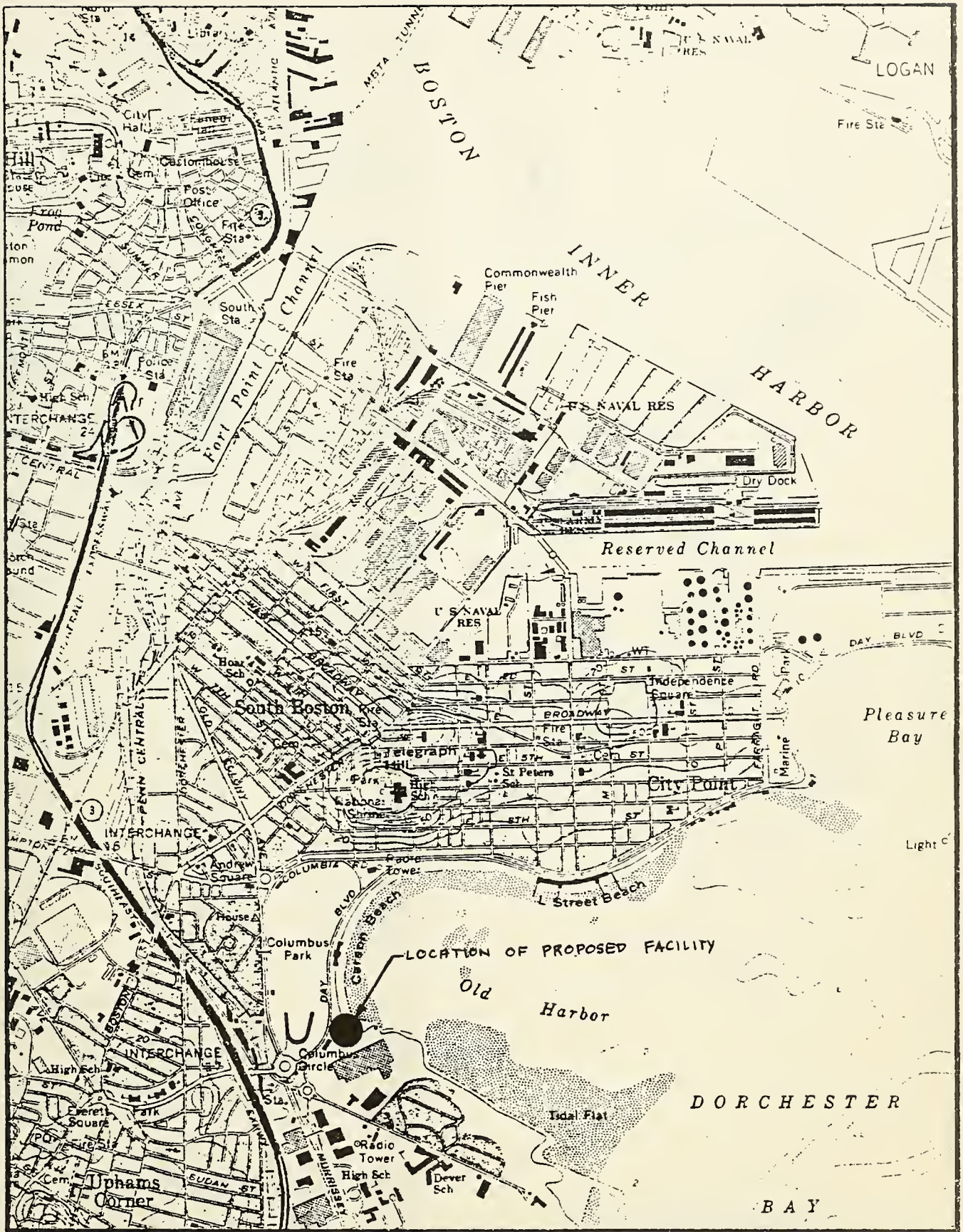
It is believed that groundwater can be controlled by ditching and open sump pumping following stripping of the site and installation of the slurry walls.

VII. CLOSURE

The evaluations and recommendations presented herein are based on a limited, preliminary subsurface exploraton and general information on structural features. It is essential that a comprehensive program of subsurface investigations and laboratory testing be undertaken during final design to determine the shear strength profile of the clay stratum at the site. It is recommended that field vane tests be included in the field program. An appropriate arrangement of field instrumentation including settlement and heave points, inclinometers and piezometers should be installed to monitor the construction.

The influence of construction on the nearby MDC police station and Day Boulevard should be considered and appropriate provisions incorporated in the construction planning.

If differing conditions are encountered during final design, the recommendations included in this memorandum should be reviewed to confirm continued applicability.



FILE NO. 4140 A5

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

N

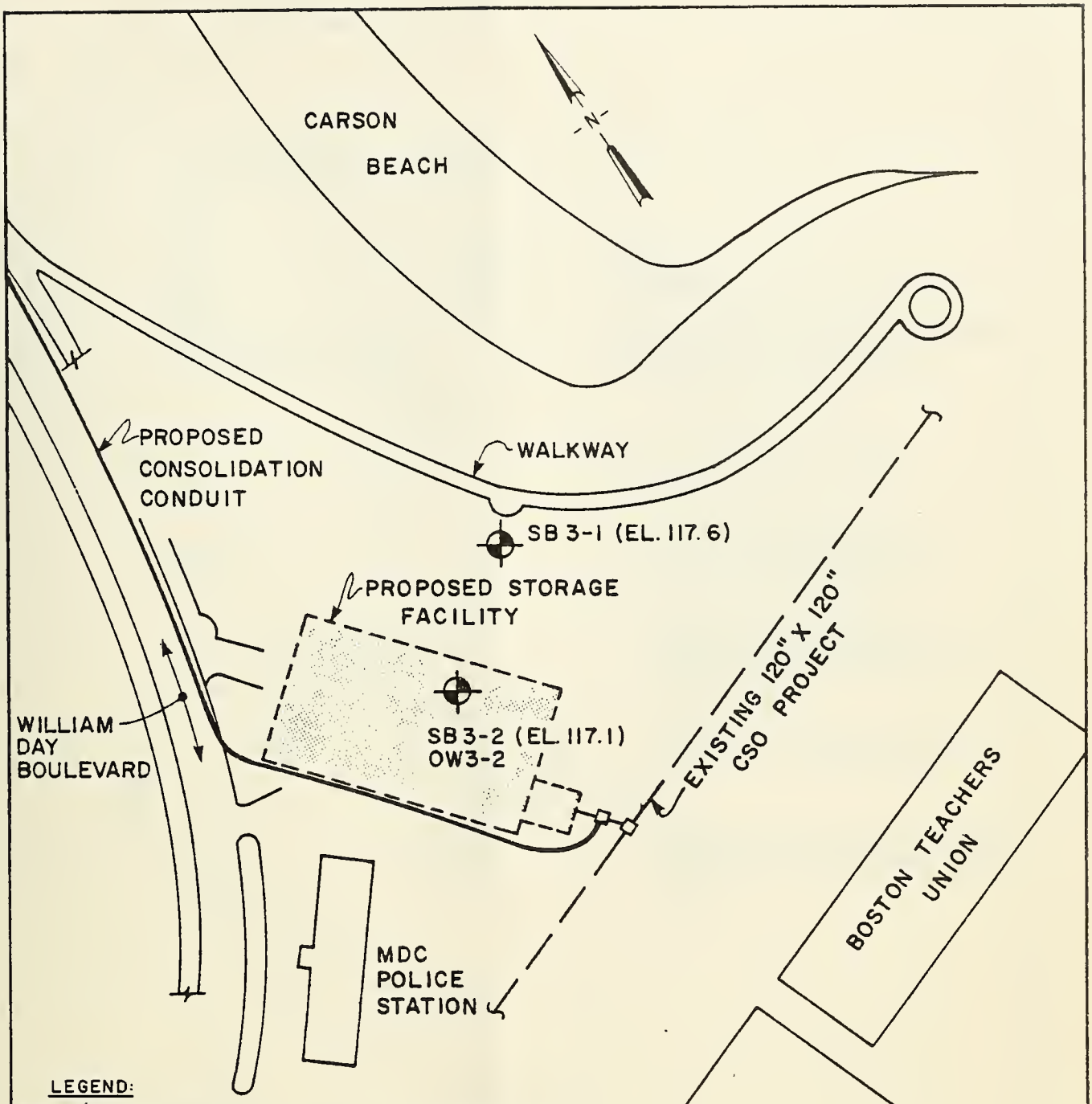
PROJECT LOCUS

U.S.G.S. QUADRANGLE

BOSTON SOUTH, MA

APPROX. SCALE: 1"= 2000'

FIGURE 1



LEGEND:

SB3-2 — LOCATION AND NUMBER OF TEST BORING DRILLED BY GUILD DRILLING CO., INC., DECEMBER 1979.

OW3-2 LOCATION AND NUMBER OF GROUNDWATER OBSERVATION WELL.

NOTES:

1. BORING LOCATIONS AND GROUND SURFACE ELEVATIONS WERE DETERMINED BY CDM.
2. ELEVATIONS ARE IN REFERENCE TO MDC DATUM.

MDC DORCHESTER BAY
CSO PROJECT
STORAGE/CONTAINMENT FACILITY

BORING LOCATION PLAN

0 100 200
SCALE IN FEET

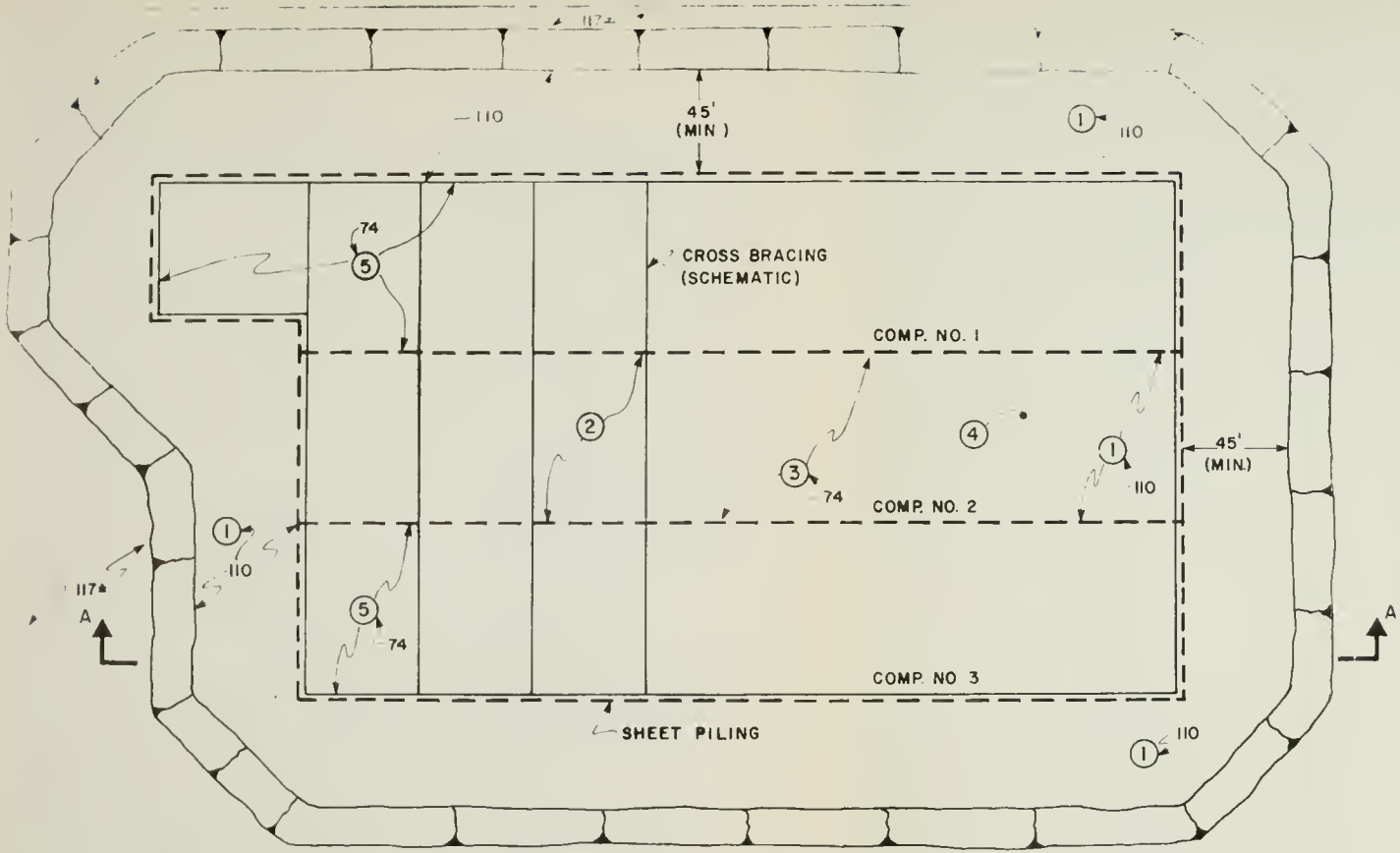
APRIL 1980

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

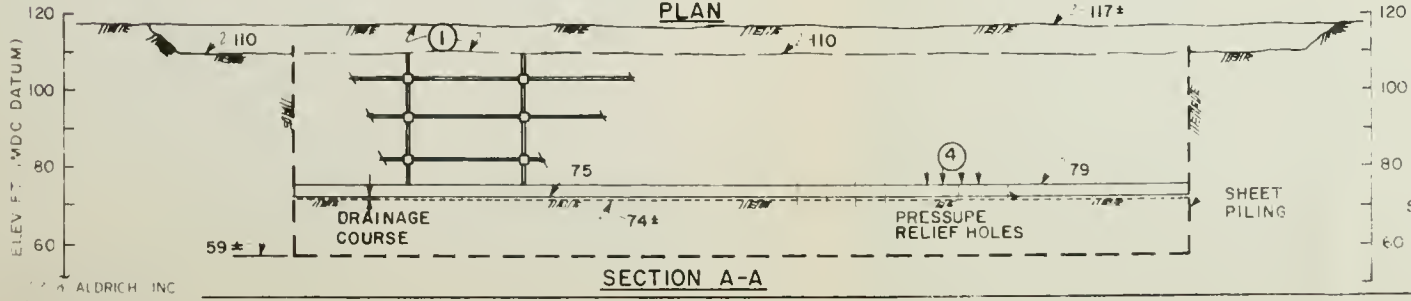
FILE NO 4140 00 A6

BRUNING 44-141 35356

FIGURE 2



PLAN



SECTION A-A

SCHEME A
PROPOSED CONSTRUCTION SEQUENCE:

ASSUMED AVERAGE UNDRAINED SHEAR STRENGTH FOR CLAY STRATUM:

S_u = 1,200 PSF

1. STRIP SITE TO EL. 110.
2. INSTALL SHEET PILING: EL. 110 TO EL. 59±.
3. EXCAVATE COMP. NO. 2 TO EL. 74±. PROVIDE CROSS BRACING, AS REQUIRED.
4. PLACE DRAINAGE COURSE AT BOTTOM OF EXCAVATION, FLOOR SLAB; PROVIDE PRESSURE RELIEF HOLES.
5. REPEAT STEP 3) AND (4) FOR COMP. NO. 1, AND COMP. NO. 3.

NOTES:

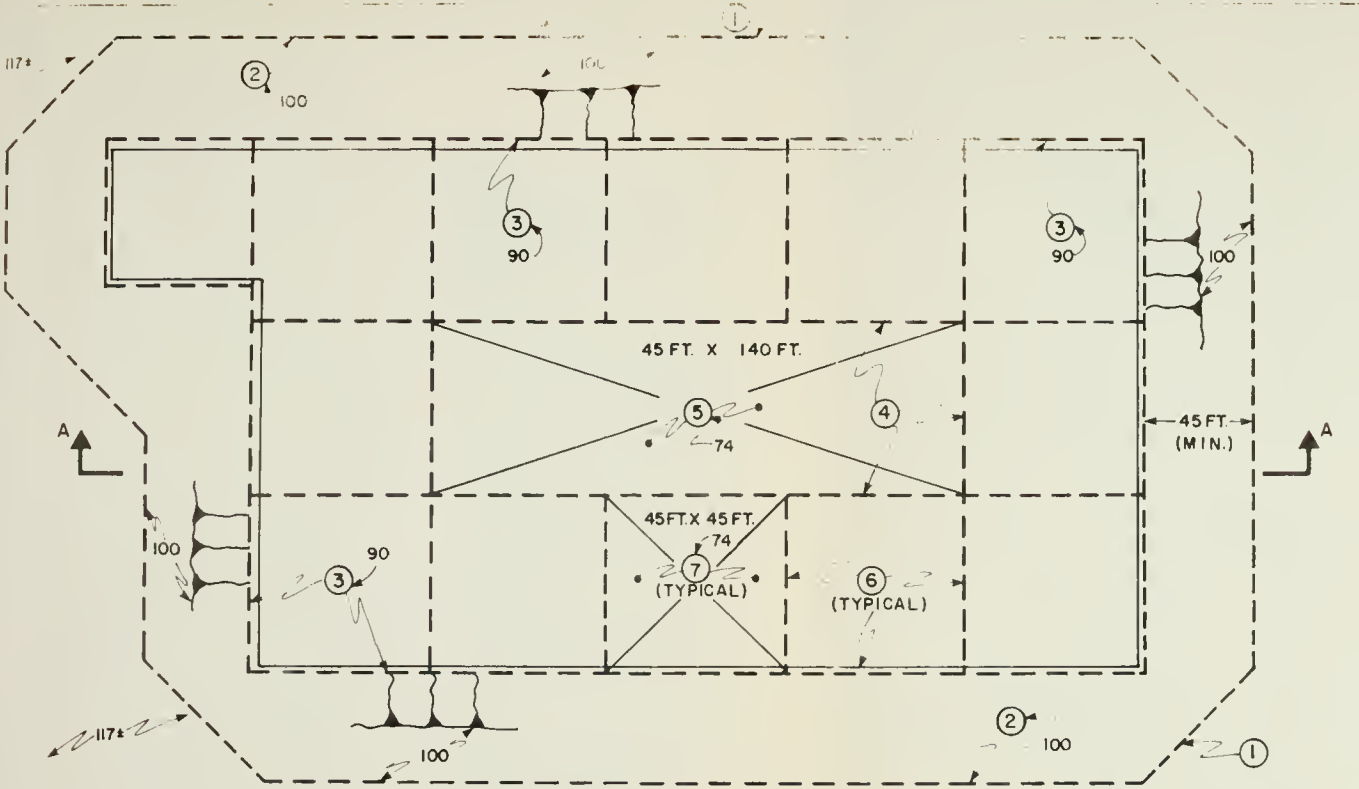
1. CROSS BRACING, PRESSURE RELIEF HOLES, ETC., ARE SHOWN SCHEMATICALLY.

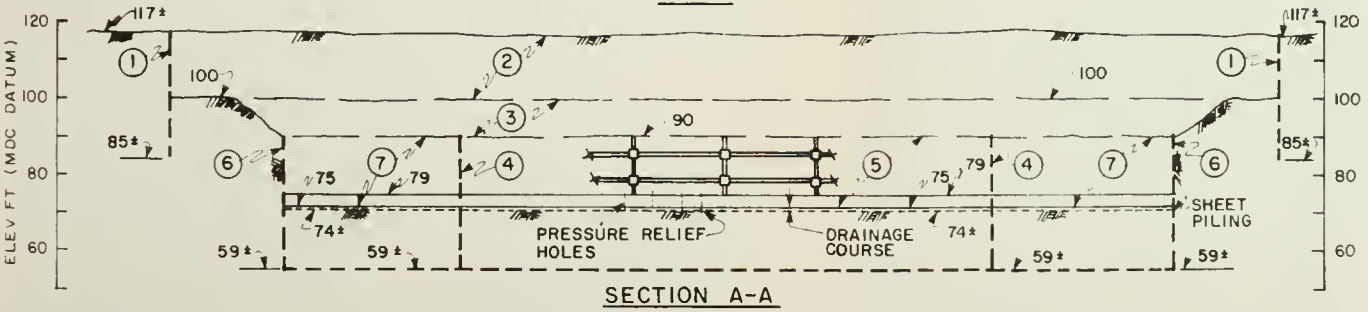
MDC DORCHESTER BAY
CSO PROJECT
STORAGE/CONTAINMENT FACILITY
CONSTRUCTION SCHEME (A)

SCALE: 1"=30' APRIL 1990

ALDRICH INC
MASSACHUSETTS

FIGURE 3





SCHEME AA
PROPOSED CONSTRUCTION SEQUENCE

ASSUMED AVERAGE UNDRAINED SHEAR STRENGTH FOR CLAY STRATUM.

S_u = 800 PSF

1. INSTALL EXTERIOR PERIMETER SHEET PILING: EL. 117 TO EL. 85±.
2. STRIP SITE TO EL. 100 WITHIN SHEETING 1 .
3. EXCAVATE CENTRAL PORTION FROM EL. 100 TO EL. 90.
4. INSTALL INTERNAL SHEET PILING: EL. 90 TO EL. 59±.
5. EXCAVATE CENTRAL 45 FT. BY 140 FT. FROM EL. 90 TO EL. 74±. PROVIDE CROSS BRACING AS REQUIRED. PLACE DRAINAGE COURSE, FLOOR SLAB; PROVIDE PRESSURE RELIEF HOLES. PLACE SURCHARGE (BALLAST) OF 150 PSF.
6. INSTALL SHEET PILING EL. 90 TO EL. 59± FOR 45 FT. BY 45 FT. COMPARTMENTS.
7. EXCAVATE 45 FT. BY 45 FT. COMPARTMENTS FROM EL. 90 TO EL. 74 IN ANY CONVENIENT ORDER. PLACE DRAINAGE COURSE, FLOOR SLAB; PROVIDE PRESSURE RELIEF HOLES. PLACE SURCHARGE (BALLAST) OF 150 PSF.

NOTES:

1 CROSS BRACING, PRESSURE RELIEF HOLES, ETC., ARE SHOWN SCHEMATICALLY.

MDC DORCHESTER BAY
CSO PROJECT
STORAGE / CONTAINMENT FACILITY

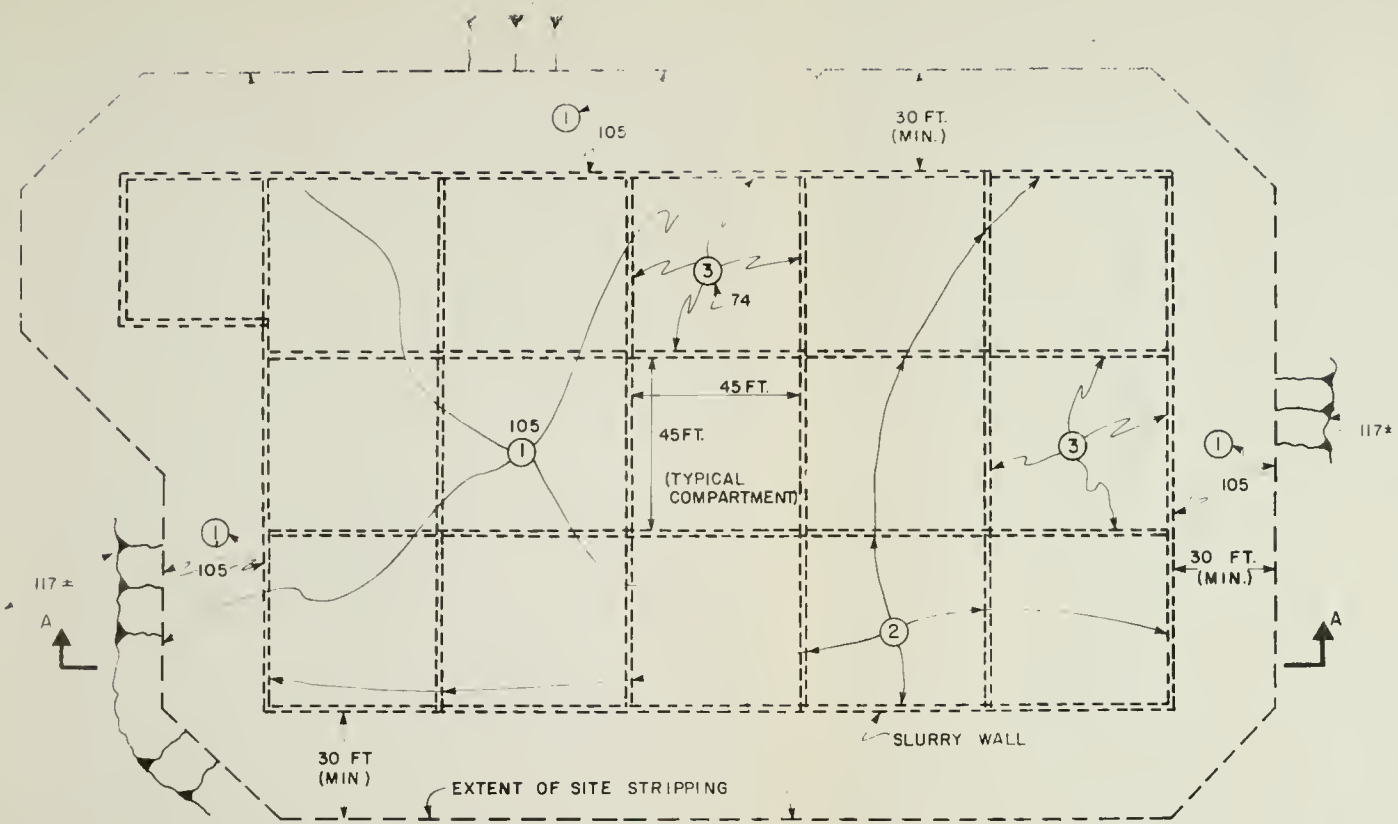
CONSTRUCTION SCHEME (AA)

SCALE: 1"=30' APRIL 1980

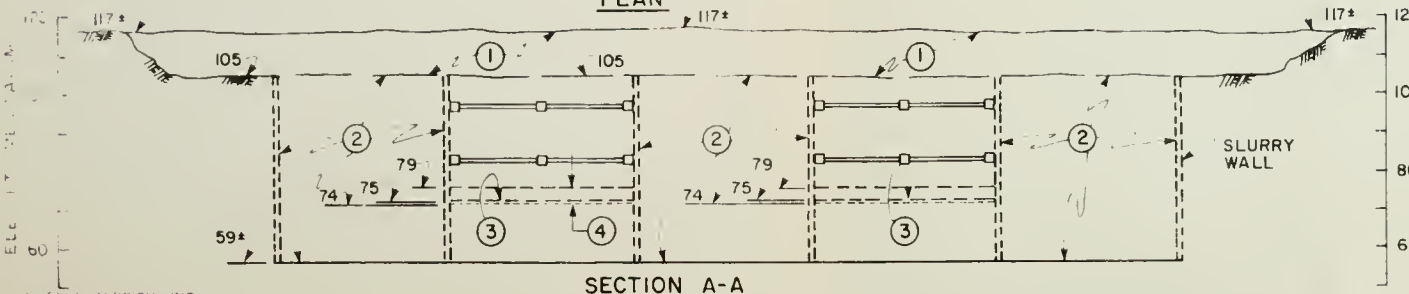
HALEY & ALDRICH INC
CAMBRIDGE MASSACHUSETTS

4140.00 88

FIGURE 4



PLAN



SECTION A-A

SCHEME B
PROPOSED CONSTRUCTION SEQUENCE:

ASSUMED AVERAGE RANGE OF UNDRAINED SHEAR STRENGTH FOR CLAY STRATUM:

S_u = 800 PSF TO 1200 PSF

(1) FOR S_u = 1200 PSF, STRIP SITE TO EL. 105 WITHIN THE LIMITS AS SHOWN (SEE NOTE 1).

(2) INSTALL SLURRY WALL FOR THE GRID SHOWN (TYPICAL COMPARTMENT SIZE: 45 FT. BY 45 FT.) FROM EL. 105 TO EL. 59±.

(3) EXCAVATE WITHIN ONE INDIVIDUAL COMPARTMENT TO EL. 74; PROVIDE CROSS BRACING, AS REQUIRED. COMPARTMENTS NOT ADJACENT SIDEWISE OR DIAGONALLY CAN BE EXCAVATED SIMULTANEOUSLY.

(4) PLACE DRAINAGE COURSE AND STRUCTURAL BASE SLAB AS SOON AS POSSIBLE UPON COMPLETION OF EXCAVATION; PROVIDE PRESSURE RELIEF HOLES.

NOTES:

1. IF DESIGN UNDRAINED SHEAR STRENGTH IS 800 PSF, STRIP SITE TO EL. 100 AND INSTALL PERIMETER SHEET PILING FOR GROUNDWATER CUTOFF.
2. CROSS BRACING, PRESSURE RELIEF HOLES, ETC., ARE SHOWN SCHEMATICALLY.

MDC DORCHESTER BAY
CSO PROJECT
STORAGE/CONTAINMENT FACILITY

CONSTRUCTION SCHEME (B)

SCALE: 1"=30' APRIL 1980

...LEY & ALDRICH, INC
...MASSACHUSETTS

FIGURE 5

APPENDIX A

Logs of Borings
by
Guild Drilling Co., Inc.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 2
DATE
HOLE NO. SB3-1
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 15' @ Comp. after Hours
At after Hours

	Rods-"NW"	CASING	SAMPLER	CORE BAR
Type		HW	S/S	
Size I D		4"	1 3/8"	
Hammer Wt		300#	140#	BIT
Hammer Fall		24"	30"	

	Date	Time
START	12/19/79	a.m. p.m.
COMPLETE	12/21/79	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	G.Brouillette	
INSPECTOR	M. Jones	
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
	10	0'-1'6"	D	6	5	12	Moist	8"	Dark Brown TOPSOIL	1	18"	16"
	11						medium		Brown fine to medium SAND			
	21						dense	3'	& Gravel - FILL			
	7											
	7	4'-5'6"	D	2	5	2	Wet		Gray Brown silty fine SAND	2	18"	12"
	14						loose					
	15											
	19							8'				
	16											
	18	9'-10'6"	D	1	1	1	Wet		Gray Yellow Blue CLAY,	3	18"	12"
	16						soft		trace of shells & fine			
	14	10'6"-12'	D	1	1	1			sand	4	18"	12"
	17											
	17											
		14'-15'6"	D	1	1	1	"			5	18"	9"
								16'6"				
		16'6"-18'4"	UP						Gray Organic SILT	UP1	22"	22"
								18'6"	with Shells			
		19'-20'6"	D	12	21	24	Wet		Gray to Yellow CLAY with	6	18"	18"
							Hard		fine Sand Layers			
								24'8"				
		24'-25'10"	UP							UP2	22"	19"
		29'-30'6"	D	2	5	5	Wet		Gray CLAY	7	18"	18"
							stiff					
		34'-35'6"	D	2	4	5	"			8	18"	18"
		@ 36'	UP							0	0	0
							Wet/m					
		39'-40'6"	D	2	3	4	stiff			9	18"	18"

GROUND SURFACE TO 20' USED HW "CASING: THEN Open to Bottom

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 79'6"
Rock Coring
Samples 15

HOLE NO SB3-1

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 2 OF 2

DATE

HOLE NO. SB3-1

LINE & STA.

OFFSET

SURF. ELEV.

TO | ADDRESS

PROJECT NAME | LOCATION

REPORT SENT TO | PROJ. NO

SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I D			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN

INSPECTOR

SOILS ENGR.

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc.	SAMPLE No	Pen	Rec.
		43'6"-45'6"	UP						Gray CLAY	UP3	24"	22"
		49'-50'6"	D	2	3	4	Wet medium stiff			10	18"	18"
		51'-52'4"	UP						(51'- 1" Sand Layer)	UP4	16"	16"
		54'-55'6"	D	1	2	3	"			11	18"	18"
		59'-60'6"	D	2	3	4	"			12	18"	18"
		64'-65'6"	D	2	3	4	"			13	18"	18"
		69'-70'6"	D	2	4	4	"			14	18"	18"
		76'-78'	UP							UP5	24"	24"
		78'-79'6"	D	1	1	2	Wet soft	79'6"		15	18"	18"
									Bottom of Boring 79'6"			

GROUND SURFACE TO _____ USED _____ "CASING. THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO SB3-1

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 4

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.

REPORT SENT TO above / Bay Area | PROJ. NO.

SAMPLES SENT TO " | OUR JOB NO. 80-208

DATE

HOLE NO. SB3-2

LINE & STA.

OFFSET

SURF. ELEV.

GROUND WATER OBSERVATIONS

At 15'6" after 1/4 Hours

22' Casing

At _____ after _____ Hours

Rods-"AW"	CASING	SAMPLER	CORE BAR.
Type	BW	S/S	
Size I D	2½"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/18/79	a.m.
COMPLETE	12/21/79	p.m.
TOTAL HRS.		a.m. p.m.

BORING FOREMAN C. Koehler

INSPECTOR M. Jones

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, grodation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
	4	0'-1'6"	D	1	3	5	Moist loose		9" Clayey Topsoil - Dark Brown Ash, Sand & Gravel FILL	1	18"	10"
	4											
	3											
	5											
	6							5'6"				
	1	5'-6'6"	D	2	1	1	Wet soft		Gray silty fine SAND (slightly organic)	2	18"	11"
	1											
	1											
	1							9'				
	1	9'6"-11'6"	ST	P R E S S						ST1	24"	24"
	1											
	1											
	1	11'6"-13'	D	1	½	½	Wet soft		Gray fine sandy Organic SILT	3	18"	18"
	1											
	1											
	1	15'-16'6"	D	3	1	1	"			4	18'	2"
	1											
	1											
	2						Moist	19'	Gray Clayey SILT, little			
	4	19'-20'	D	9	4		stiff	20'	fine sand	5A	18"	14"
	12	20'-20'6"	D			10	M/loose	20'6"	Yellow Brown fine silty SAND & Gray Clay Lenses	5B		
	14						Moist					
		20'6"-22'	D	17	19	22	Hard		Yellow silty CLAY (mottled)	6	18"	13"
		22'-24'	ST	PRESS 10"		3/2"				ST2	24"	18"
				6/6"	5/6"	(300#)						
		25'-26'6"	D	4	5	7	Wet stiff			7	18"	18"
								28'				
							Wet					
		30'-31'6"	D	2	3	4	medium stiff		Blue CLAY, trace of very fine sand lenses	8	18"	16"
		34'-36'	ST	P R E S S						ST3	24"	24"
		36'-37'6"	D	2	2	3	"			9	18"	18"

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY

Earth Boring 157'

Rock Coring

Samples 33

HOLE NO SB3-2

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 2 OF 4

DATE

HOLE NO. SB3-2

LINE & STA.

OFFSET

SURF. ELEV.

TO | ADDRESS

PROJECT NAME | LOCATION

REPORT SENT TO | PROJ. NO.

SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I D			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN

INSPECTOR

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock - color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		40'-41'6"	D	1	1	2	Wet soft		Blue CLAY, trace of very fine sand lenses	10	18"	18"
		45'-46'6"	D	1	3	3	Wet medium stiff			11	18"	18"
		47'-49'	ST	P R E S S						ST4	24"	24"
		50'-51'6"	D	1	2	2	Wet soft			12	18"	18"
		55'-56'6"	D	1	2	1	"			13	18"	18"
		62'-63'6"	D	2	2	2	"			14	18"	18"
		65'-66'6"	D	1	1	2	"			15	18"	18"
		70'-71'6"	D	1	1	1	"			16	18"	18"
		75'-76'6"	D	1	1	1	"			17	18"	18"

GROUND SURFACE TO _____ USED _____ CASING: THEN _____

Sample Type

D = Dry C = Cored W = Washed

UP = Undisturbed Piston

TP = Test Pit A = Auger V = Vane Test

UT = Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY:

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO SB3-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 3 OF 4
DATE
HOLE NO. SB3-2
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO.
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At ____ after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I D			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		
BORING FOREMAN		
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
		80'-81'6"	D	1	1	1	Wet soft		Blue CLAY, trace of very fine sand lenses	18	18"	18"
		85'-86'6"	D	1	1	1	"			19	18"	18"
		90'-91'6"	D	1	1	1	"			20	18"	18"
		95'-96'6"	D	1	2	2	"			21	18"	18"
		100'-101'6"	D	2	3	2	Wet medium stiff			22	18"	18"
		105'-106'6"	D	2	4	3	"			23	18"	18"
		110'-111'6"	D	1	1	1	Wet soft			24	18"	18"
		115'-116'6"	D	1	1	1	"			25	18"	18"

GROUND SURFACE TO ____ USED ____ "CASING: THEN ____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring ____
Rock Coring ____
Samples ____

HOLE NO SB3-2

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 4 OF 4
DATE
HOLE NO. SB3-2
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At ____ after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I D			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN
INSPECTOR
SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
		120'-121'6"	D	1	1	1	Wet soft		Blue CLAY, trace of very fine sand lenses	26	18"	18"
		125'-126'6"	D	1	1	1	"			27	18"	18"
		130'-131'6"	D	Wt.	of Rods		"			28	18"	18"
		135'-136'6"	D	1	1	1	"			29	18"	18"
		140'-141'6"	D	Wt.	Rods	6	Wet medium stiff	145'		30	18"	18"
		145'-146'6"	D	12	17	14	Wet dense	148'	Gray silty fine SAND, trace of clay	31	18"	12"
		150'-151'6"	D	1	2	2	Wet soft	153'	Gray CLAY varved with little very fine sand	32	18"	17"
		155'-157'	D	66	60	61	Moist very dense	157'	Gray sandy SILT, little gravel Gray Purple weathered ARGILLITE	33	24"	18"
				100/3"		150/3"						
		@ 157'	D	50/0" (300#)					Refusal-Bottom of Boring 157'			
							Well Point at of P Stone -		20' with Gate Box - 4 Bags 1/2 Bag of Ottowa Sand			

GROUND SURFACE TO ____ USED ____ "CASING: THEN ____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring
Rock Coring
Samples

HOLE NO SB3-2

TOWN PRESS - EAST PROV.

APPENDIX B

Groundwater Observation Well
Installation Sheet and Data

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER OBSERVATION WELL REPORT

PROJECT: DORCHESTER BAY C.S.O.
LOCATION: SOUTH BOSTON, MA.
CLIENT: CAMP DRESSER & MCKEE
CONTRACTOR: GUILD DRILLING CO.
DRILLER: C. COLLETT INSPECTOR: G. JACOBSEN
INSTALLATION DATE 21. DEC. 1979

FILE NO. 4140
WELL NO. OW 3-2
BORING NO. SB 3-2
LOCATION SEE PLAN
SHEET 1 OF 2

SURVEY DATUM MDC
GROUND ELEVATION ℄ 117.1

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

CINDERY SILT, SOME GRAVEL & SAND

5.5

ORGANIC SILTY SAND TO ORGANIC SILT

ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.1
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE.	0.0
THICKNESS OF SURFACE SEAL	GROUND FROZEN; COULD NOT PUT IN CONCRETE AT THIS TIME - CONCRETE
TYPE OF SURFACE SEAL	
[INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	
TYPE OF CASING	ROADWAY BOX
INSIDE DIAMETER OF CASING	2 IN.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.1 FT
INSIDE DIAMETER OF RISER PIPE	1 1/2 IN. ID
TYPE OF BACKFILL AROUND RISER	PEA STONE
DIAMETER OF BOREHOLE	3 IN.
ELEVATION/DEPTH OF BOTTOM OF RISER	9.6
TYPE OF POINT OR MANUFACTURER	SLOTTED P.V.C.
SCREEN GAUGE OR SIZE OF OPENINGS	0.030 IN.
DIAMETER OF WELLPOINT	1 1/2 IN. ID
TYPE OF BACKFILL AROUND POINT	OTTAWA SAND
ELEVATION/DEPTH OF BOTTOM OF POINT	19.6
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	157.0 FT

[FIGURES REFER TO: EL. ____ DEPTH ____]

[2.2 / LENGTH OF CASING L_3] [9.6 / LENGTH OF RISER PIPE (L_1) + 10.0 / LENGTH OF POINT (L_2) = 19.6 / PAY LENGTH]

H&A FORM 59 SEP 72

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/~~PZ~~ NUMBER: OW 3-2

ELEVATION SUBTRAHEND _____

FILE NO. 4140

PAGE NO. 2

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM TOP OF BOX	ELEVATION OF WATER	REMARKS	READ BY
21. DEC, 79	16:00	0.5 HRS.	4.6			G.J.
26. DEC.	15:00		8.1	109.1	COVER FROZEN	G.J.
27. DEC.	15:00		–			JRH
31. DEC.	13:00		8.2	109.0		JRH
2. JAN, 80	15:00		8.1	109.1		JRH
3. JAN.	15:00		8.2	109.0		JRH
4. JAN.	12:30		8.2	109.0	HIGH TIDE	JRH
14. JAN.	9:40		8.9	108.3		JSC
21. JAN.	9:35		8.2	109.0		JSC
30. JAN.	10:00		8.8	108.4		JSC
6. FEB.	9:20		8.8	108.4		JSC
13. FEB.	10:35		8.9	108.3		JSC
13. MAR.	10:50		7.3	109.9	FIELD FLOODED ON OCEAN SIDE OF WELL 3 IFT. FROM O.W.	JSC

H&A FORM JAN. 79 59A

APPENDIX C

Laboratory Test Results

NAVFAC FORM 6-FEB.74

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO. 4140

SHEET 1 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ.FT.	C_c	
SB3-1/U1	Dark gray ORGANIC SILT with shells, occasional fine sand partings	16.5 -1	8.5				(111.9)					
		17.0		50.4								TV = 0.37 PP = 0.75 SV = 0.38 R = 0.05
		17.2		33.8								
		17.8		41.8								TV = 0.35 PP = 0.6 SV = 0.39 R = 0.06
		18.0	L6	47.1	53.0	27.5						
		18.1	C4	51.1			107.7			See curve		
		18.3	UC12	51.1			103.5	1410	5.8			
SB3-1/U2	Gray silty CLAY	24-25.9					(122.1)					
		25.1		25.9								TV = 0.85 PP = 2.0 SV = 0.96 R = 0.16
		25.3	UC13	30.3			119.2	3580	15.2			
		25.6	L7	28.5	40.4	19.8						
		25.7	C5	29.5			125.6			See curve		
		25.8		26.8								TV = 0.68 PP = 1.6 SV = 0.76 R = 0.15

H&A FORM C – FEB.74

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC COMBINED SEWER OVERFLOW STUDY
SOUTH BOSTON, MA

FILE NO. 4140
SHEET 2 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ.FT.	C_c	
SB3-1/U3	Gray silty CLAY, occasional sand partings, few fissures	43.5 - 45.5					(117.7)					
		44.0		37.5								TV = 0.5 PP = 1.4 SV = 0.71 R = 0.07
		44.2	UC	37.3			115.6	1460	7.6			
		44.5		37.1								TV = 0.6 PP = 1.5 SV = 0.55 R = 0.08
		44.7	UC	38.0			115.3	1350	8.4			
		45.0		30.9								TV = 0.3 PP = 1.2 SV = 0.6 R = 0.08
SB3-1/U4	Gray clayey medium SAND changing to gray silty CLAY with fine sand partings at 77.2 feet	76 - 78					(120.2)					
		76.9		24.4								TV = 0.05 PP = 1.2 SV = 0.2 R = 0.02
		77.2	UC	28.5			117.8	420	6.8			
		77.4		31.1								
		77.7	UC	36.1			114.7	1220	15.2			TV = 0.22 PP = 0.5 SV = 0.22 R = 0.05

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC COMBINED SEWER OVERFLOW STUDY
SOUTH BOSTON, MA

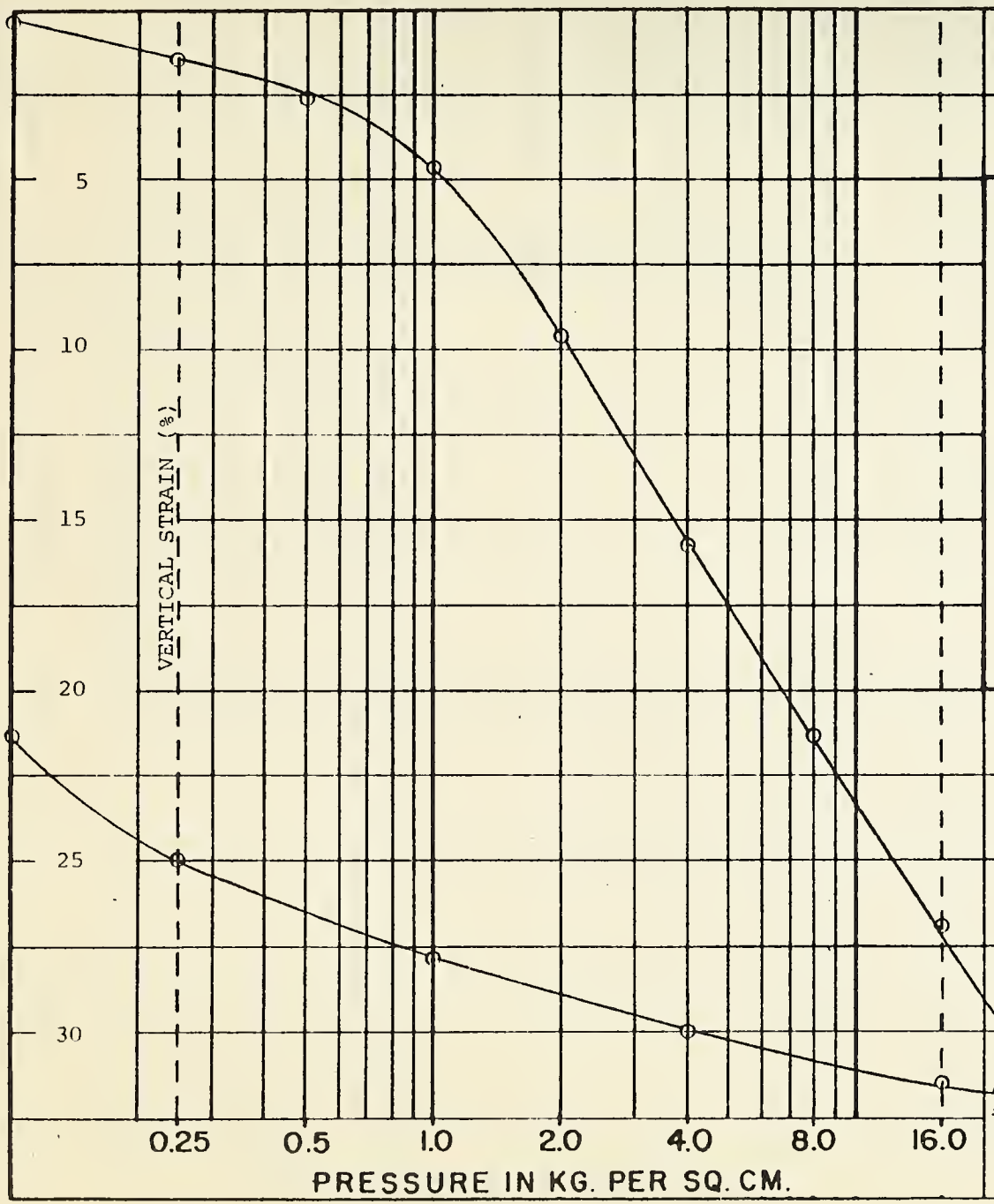
FILE NO. 4140
SHEET 3 OF 3

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ. FT.	C_c	
SB3-1/U5	Gray silty CLAY	76 - 78					(112.0)					
		76.3		44.2								TV = 0.3 PP = 0.75 SV = 0.36 R = 0.06
		76.8	UC	42.5			111.5	1230	1.4			
		77.1		46.1								
		77.3	UC	47.7			110.5	2420	2.6			
		77.6		46.2								TV = 0.35 PP = 0.75 SV = 0.38 R = 0.05

NOTES:
TV = Shear strength in TSF as measured by Torvane manufactured by Soiltest.
SV = Shear strength in TSF as measured by Lab Vane manufactured by Geonor.
R = Remolded strength in TSF as measured by Lab Vane manufactured by Geonor.
PP = Compressive strength in TSF as measured by Pocket Penetrometer manufactured by Soiltest.
( ) = Unit weight of entire tube sample.

H&A 50
AUG. '75

HALEY & ALDRICH, INC.



SOIL DESCRIPTION Dark gray ORGANIC SILT

BORING SB3-1 SAMPLE U1 DEPTH 18.1 ft.

WATER CONTENT

NATURAL 51.1%

AFTER TEST 33.4%

ATTERBERG LIMITS

LIQUID LIMIT 53.0%

PLASTIC LIMIT 27.5%

NATURAL WATER CONTENT 47.1%

INITIAL VOID RATIO 1.364

NOTE

1 KG. PER SQ.CM = 1.024 TONS PER SQ. FT.

MDC Combined Sewer Outflow Study
South Boston, Massachusetts

CONSOLIDATION TEST

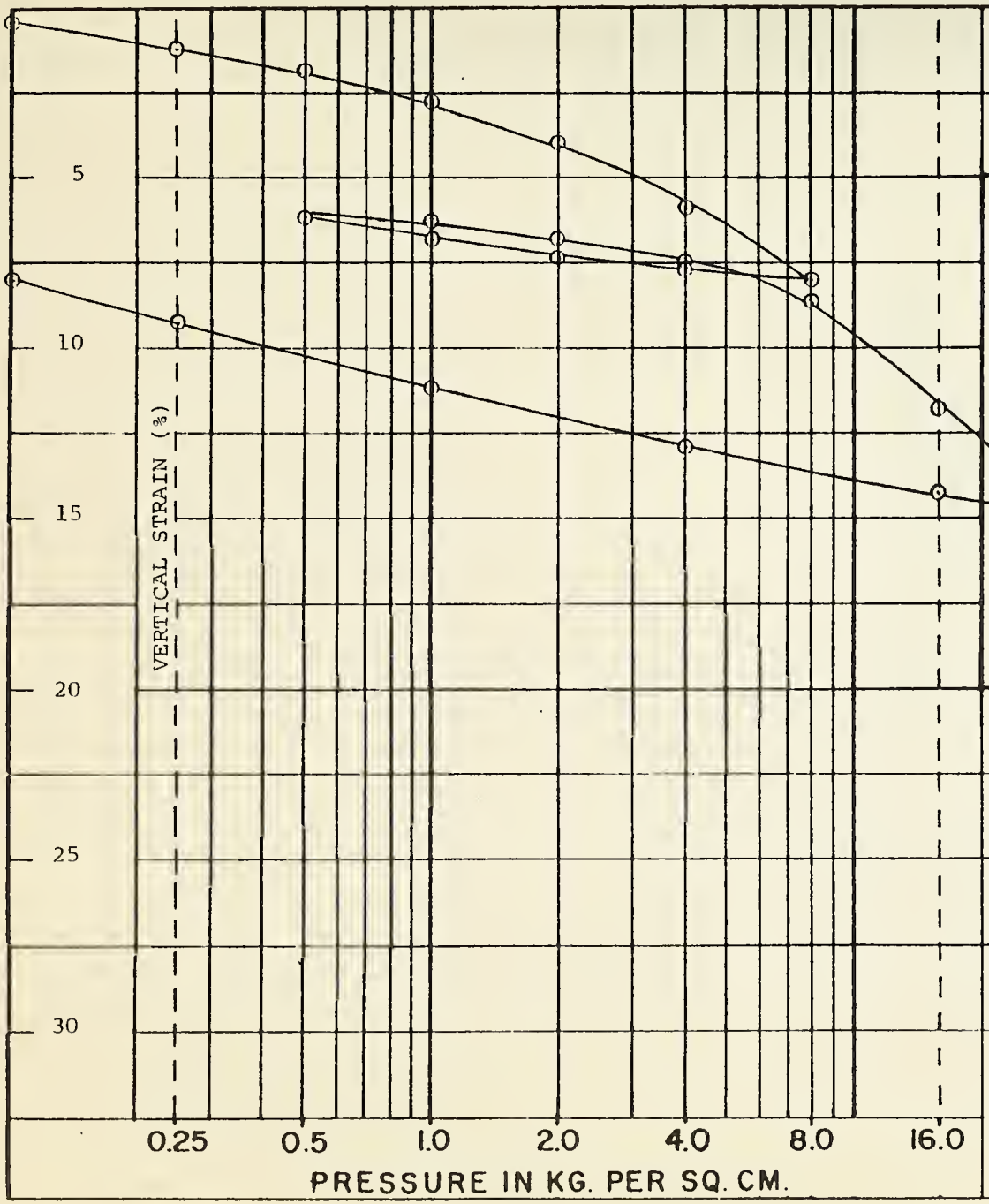
NO. C4

FILE NO. 4140

DATE January 1980

H&A FORM 50
AUG. '75

HALEY & ALDRICH, INC.



SOIL DESCRIPTION Gray silty CLAY

BORING SB3-1 SAMPLE U2 DEPTH 25.6 ft.

WATER CONTENT

NATURAL 29.5%

AFTER TEST 25.0%

ATTERBERG LIMITS

LIQUID LIMIT 40.4%

PLASTIC LIMIT 19.8%

NATURAL WATER CONTENT 28.5%

INITIAL VOID RATIO 0.739

NOTE

1 KG. PER SQ CM = 1.024 TONS PER SQ. FT.

MDC Combined Sewer Outflow Study
South Boston, Massachusetts

CONSOLIDATION TEST

NO. C5

FILE NO	DATE
4140	January 1980

DORCHESTER -
COMMERCIAL POINT
SCREENING/DISINFECTION FACILITY

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

HALEY & ALDRICH, INC.
238 MAIN STREET · CAMBRIDGE · MASSACHUSETTS 02142
617/492-6460

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JOSEPH J. RIXNER
ALLEN W. HATHEWAY
GARY S. BRIERLEY
RICHARD P. STULGIS

Revised 24 March 1980
File No. 4140

MEMORANDUM

TO: Camp, Dresser & McKee, Inc.
Attn: Mr. Steve Hickox
Mr. Victor Coletti

FROM: Haley & Aldrich, Inc.
Edward B. Kinner
Kenneth L. Recker

SUBJECT: Preliminary Geotechnical Design Criteria and Construction Considerations
MDC Combined Sewer Overflow Study
Proposed Screening and Disinfection Facility at Commercial Point, Dorchester, Massachusetts

I. INTRODUCTION

The proposed screening and disinfection facility is to be located in the northeastern portion of McMorrow Park, east of an existing basketball court and Victory Road and south of the Penn Central Railroad Right-of-Way in Dorchester, Massachusetts (see Figure 1, Project Locus). The proposed site is relatively flat with approximate ground surface at El. 115.5 (MDC Sewers Datum).

It is understood that the proposed screening and disinfection facility will consist of a single story structure and a section of sewer conduit approximately 200 ft. long. The conduit will be incorporated into a below-grade portion of the building where it passes below the structure. The structures have the following design characteristics:

- Screening facility structure plan dimensions: 52 ft. by 34 ft.
- Main floor: El. 116.75
- Finish exterior grade: El. 116±
- Conduit cross-section interior dimensions: 8 ft. by 10 ft.
- Conduit invert: El. 98

The proposed conduit will connect to the existing Commercial Point conduit. Available information indicates that the existing conduit is pile supported although specific information at this section of the conduit is lacking.

II. SUBSURFACE EXPLORATIONS

Two test borings, D2-1 and D2-2, were drilled at locations shown on Figure 2, during the period 3 to 4 January 1980, to obtain subsurface information regarding soil and water conditions. Boring D2-2 was located at the initial proposed location of the one story structure. However, the proposed location was subsequently moved 70 ft. westerly. Thus specific subsurface information at the relocated position is not available. The borings were drilled to depths of 60.5 and 30.5 feet, respectively. The borings were 2-1/2 in. diameter standard drive sample borings and terminated in naturally deposited inorganic soils. An observation well was installed in boring D2-2. The test borings were drilled by Guild Drilling Company, Inc., of East Providence, Rhode Island and monitored by Haley & Aldrich personnel.

Boring locations and elevations were determined by CDM personnel.

III. SUBSURFACE CONDITIONS

Subsurface explorations reveal the following generalized soil sequence beginning at ground surface and extending downward:

1. Fill
2. Organic Silt
3. Silt and Clay
4. Glacial Till
5. Bedrock

Fill: As disclosed by the borings, the fill consists of loose to compact medium to fine sand with a trace gravel, silt. roots, cinders and glass. The thickness of the fill varies from 5 to 8 feet.

Organic Silt: An approximately 17-ft. thick stratum of soft gray to black organic silt, with a trace fine sand and shells, was encountered directly underlying the fill at boring D2-2. However, no organics were encountered at boring D2-1. In this connnection, it should be noted that boring D2-2 is located in what is shown as being a marshland on old plans of the area. Therefore, the presence and thickness of organic silt in the proposed site area will be a function of tbe specific limits of the original marsh and are not known with accuracy.

Silt and Clay: A stratum of medium stiff to very stiff, gray interbedded fine sandy silt and silty clay was encountered in boring D2-1 underlying the fill. The stratum was observed to be 33 feet in thickness. In boring D2-2, this layer was encountered underlying the organic silt.

Glacial Till: A deposit of compact to very compact brown silty coarse to fine sand to sandy silt with a trace gravel and clay and cobbles and boulders known as glacial till underlies the silt and clay deposit, as observed in boring D2-1. Boring D2-1 penetrated to a depth of 21 ft. below the top of glacial till.

Bedrock: In New England bedrock generally underlies glacial till. The last sample in boring D2-1 may have encountered weathered bedrock.

Groundwater readings, obtained during January and February 1980 from the observation well installed in boring D2-2, indicate an approximate groundwater level at El. 108. The water level at the site can be expected to vary with precipitation, season, temperature and construction activity in the area. Therefore, levels encountered during construction may not be the same as those recorded for the observation well.

IV. PRELIMINARY DESIGN RECOMMENDATIONS

The thickness and extent of fill and organic soils can be expected to be quite variable and dependent upon the original limits of a former marshland which occupied a portion of the site area.

Based on information disclosed in boring D2-2, the proposed bottom of the conduit might be underlain by 5 or more feet of organic silt. The one-story structure will be underlain by fills and possibly also by organic soils.

The organic silt and fill soils are unsuitable for support of any foundation units. Structural units founded on these soils can be expected to experience relatively substantial post-construction movements resulting from compression of the organic soils. Foundation units for the proposed structures must be supported on or within the naturally deposited inorganic soils which lie below the organic silt and fill.

Two foundation schemes were investigated for support of the screening and disinfection facility and the conduit:

- Earth support of the structures after removal of unsuitable soils and replacement with compacted structural fill.

- Low capacity piles, likely bearing in the glacial till soils below the silts and clays. Creosoted timber piles with 20-ton structural capacity were considered.

Based on our preliminary analysis, it is recommended that the structures be supported on piles designed to bear as end bearing piles below the organic silt and that the lowest level slabs be designed as a structural slab spanning between pile support points. It is our opinion that the relatively large excavation and significant dewatering that would be required for the excavation/replacement of the unsuitable soils below both tbe building and conduit makes this scheme less attractive economically. Also, the proximity of Victory Road to the one-story structure location would complicate the required excavation of unsuitable soils from limits laterally beyond the structure.

It is recommended that the piles be treated timber piles having a maximum structural load capacity of 20 tons with lengths on the order to 20 to 35 ft. below expected foundation level. The timber piles should consist of Yellow Pine, Douglas Fir or Oak treated with at least 12-lb. retention of creosote per ft. of

pile. It is recommended that piles have a minimum tip diameter of 8 in.

Design loads to be considered for support of the conduit should be equal to the sum of the weight of the conduit, transported product and overlying soil contained within an area defined by 2 vertical to 1 horizontal lines rising from each side at the top of the conduit up to the final grade.

It is our opinion that the site should be considered a Class B site in accordance with the seismic provisions of the Massachusetts State Building Code. The subsoils at the site are not considered susceptible to liquefaction. If calculation of lateral seismic forces is required for design, a soil factor of S = 1.5 should be used.

Since the conduit will be a buried structure, extending below the water table, it will be subjected to hydrostatic uplift forces. We recommend that the conduit be designed to resist the uplift forces that would be calculated based on a recommended maximum design water level of El. 115.0.

The overlying soil contained within the envelope defined previously for support may be relied upon to resist uplift forces. It should be assumed for preliminary design that the tapered timber piles have no resistance to uplift forces.

It is understood that the final site grade will be at approximately El. 116.0 and thus there will be little or no change in site grades. Consequently, no significant post-construction settlements of the finished grade are expected.

V. CONSTRUCTION CONSIDERATIONS

5-01. General

The primary purpose of this section of the report is to comment on items related to excavation, dewatering, lateral support, earthwork and related geotechnical aspects of the proposed construction. It is written primarily for the engineer having responsibility for preparation of preliminary design and cost estimates.

5-02. Conduit

A preliminary evaluation of excavation methods, including a sloped open excavation and a sheeted excavation was conducted.

The revised location of the proposed conduit is a minimum of 13 ft. from Victory Road and 15 ft. from adjacent property. Since the maximum depth of excavation will be 20 ft., it is recommended that a laterally supported, sheeted excavation be used for the portion of the excavation along Victory Road, and along the property of 81-83 Victory Road.

For preliminary cost estimates, it may be assumed that 35 ft. long sheet piles are required for stability and seepage cut-off. Internal bracing would be required to support the sheeting. It is our opinion that, for this excavation scheme, the groundwater could be controlled by sumps and open pumping. All excavation and foundation construction should be conducted in-the-dry. If the conduit is pile supported, it would be possible to extract the sheeting upon completion of the backfilling operations.

The contractor may elect to use a sloped, open excavation for the remainder of the excavation, not adjacent to other properties. Due to the presence of the former marsh, it is difficult to identify the character of the materials in this area with available information. Should organic materials be encountered, it is recommended that sheeting be driven for the entire excavation, since an open cut in the organic soils would require a slope as flat as 10 horizontal to 1 vertical, in order to provide adequate stability. In this case, the recommendations and comments relative to the sheeting also apply.

If the soils in this vicinity are naturally deposited, inorganic soils, and the groundwater can be successfully controlled during construction, then an open excavation can be accomplished. Temporary slopes for excavation should not exceed 1 horizontal to 1 vertical.

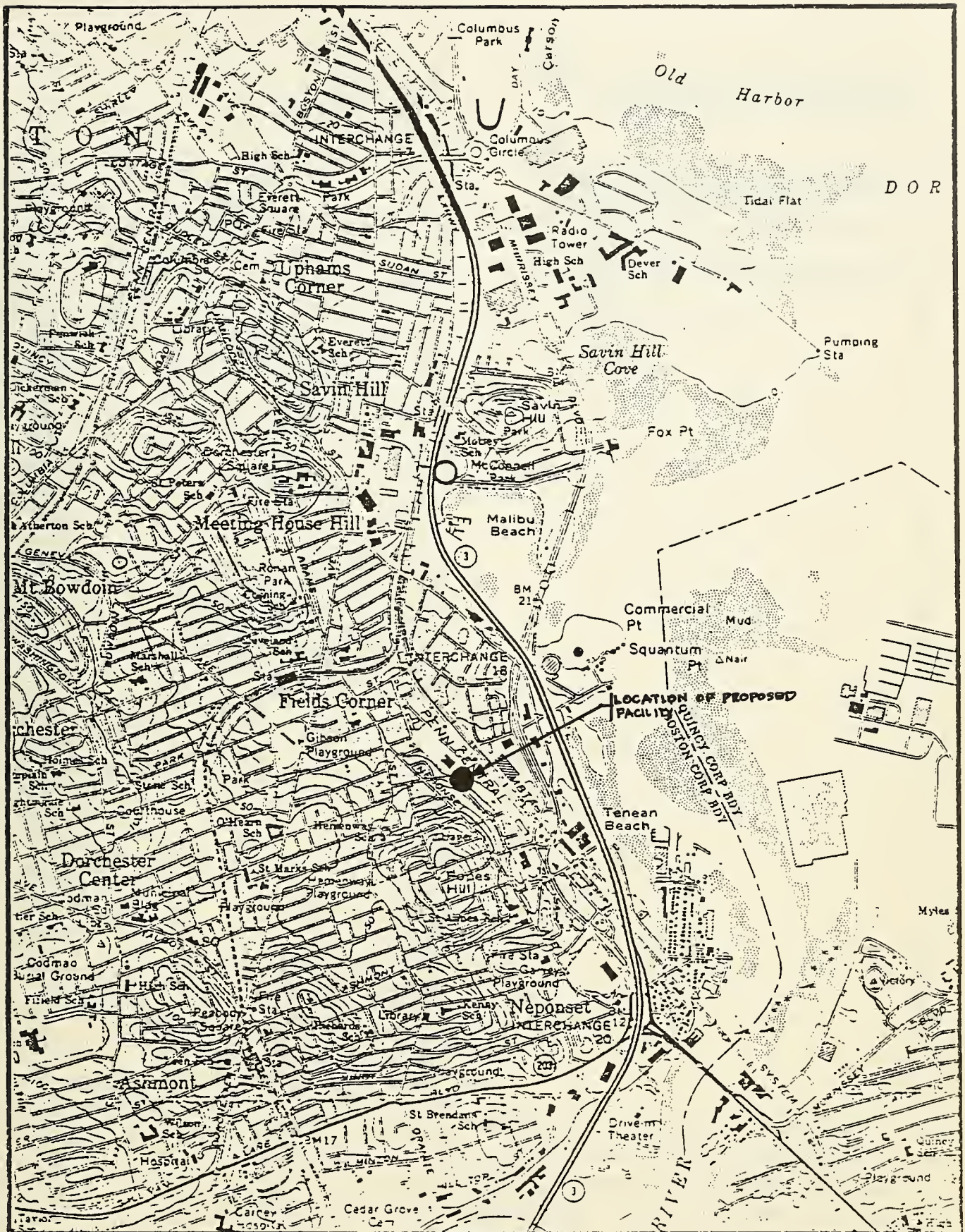
It is our opinion that in this case, the fill materials would require pre-drainage if the water level is significantly above the bottom of the fill soils. All excavation and foundation construction should be conducted in-the-dry.

5-03. Screening/Disinfection Facility

It is anticipated that foundation construction for the proposed screening/disinfection facility, with the exception of the below-grade portion of the conduit, can be accomplished with open excavation and nominal dewatering.

VI. CLOSURE

Since the proposed location of the screening/disinfection facility has been modified since the preliminary boring program, it is recomended that additional subsurface investigations be undertaken to identify the soils present in the revised location. Additional subsurface investigations would also more clearly determine the depth of fill and organic soils as regards dewatering characteristics, and depth to suitable bearing soils for purposes of estimating pile lengths. If differing conditions become evident during final design explorations, the recommendations included in this memorandum should be reviewed to confirm continued applicability.



HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

N

PROJECT LOCUS

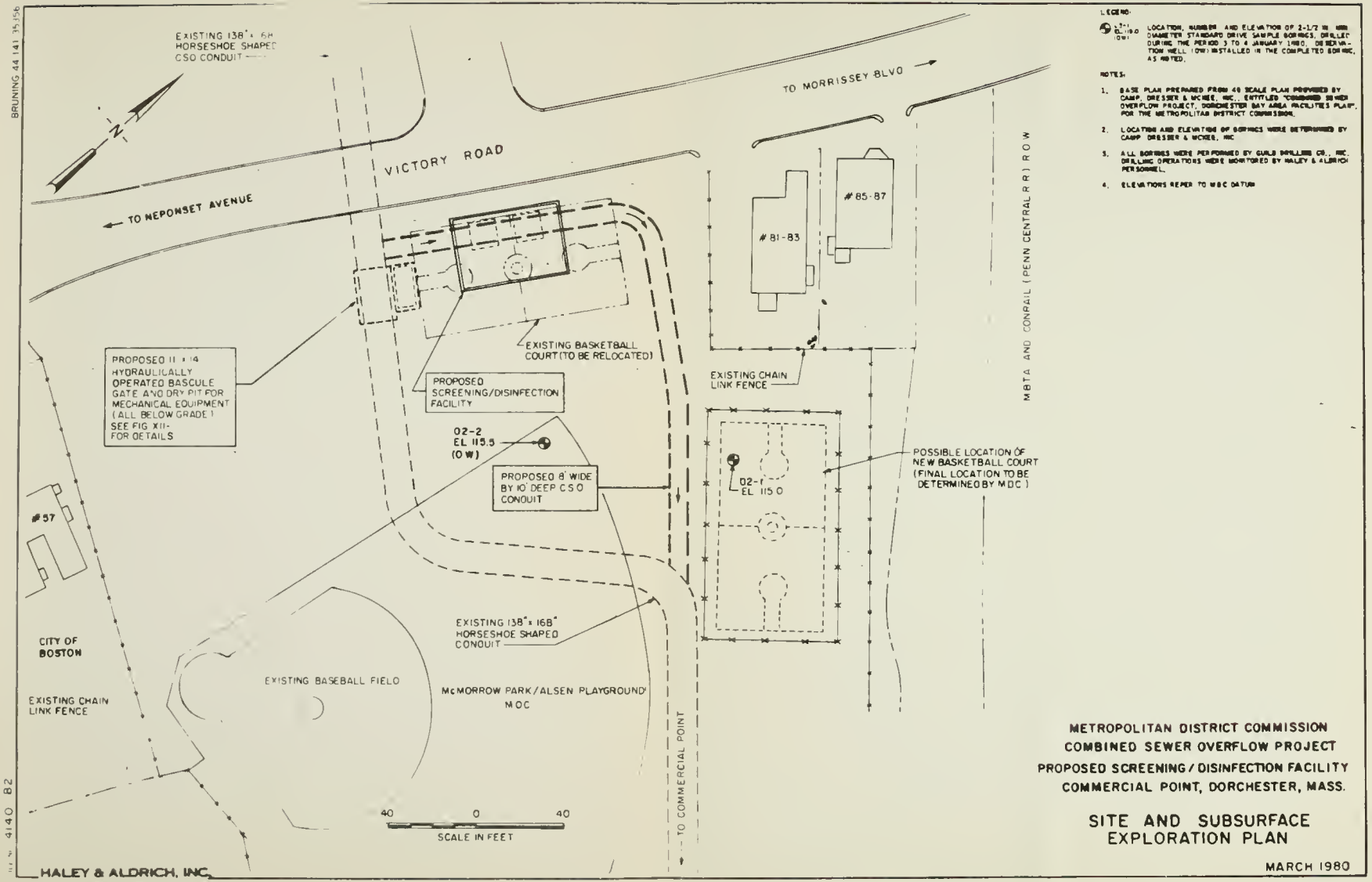
U.S.G.S. QUADRANGLE

BOSTON SOUTH, MA

APPROX. SCALE: 1"= 2000'

FILE NO. 4140 A1

FIGURE 1


EXISTING 138" x 6H HORSESHOE SHAPED CSO CONDUIT
TO MORRISSEY BLVD
VICTORY ROAD
TO NEPONSET AVENUE
#81-83
#85-87
MBTA AND CONRAIL (PENN CENTRAL R R) R O W
EXISTING BASKETBALL COURT (TO BE RELOCATED)
PROPOSED 11 x 14 HYDRAULICALLY OPERATED BASCULE GATE AND DRY PIT FOR MECHANICAL EQUIPMENT (ALL BELOW GRADE) SEE FIG XII- FOR DETAILS
PROPOSED SCREENING/DISINFECTION FACILITY
EXISTING CHAIN LINK FENCE
02-2 EL 115.5 (O W)
PROPOSED 8' WIDE BY 10' DEEP CSO CONDUIT
02-1 EL 115.0
POSSIBLE LOCATION OF NEW BASKETBALL COURT (FINAL LOCATION TO BE DETERMINED BY MDC)
#57
CITY OF BOSTON
EXISTING CHAIN LINK FENCE
EXISTING BASEBALL FIELD
McMORROW PARK/ALSEN PLAYGROUND MDC
EXISTING 138" x 168" HORSESHOE SHAPED CONDUIT
TO COMMERCIAL POINT
40 0 40
SCALE IN FEET
LEGEND:
LOCATION, NUMBER AND ELEVATION OF 2-1/2 IN. MIN. DIAMETER STANDARD DRIVE SAMPLE BORINGS, DRILLED DURING THE PERIOD 3 TO 4 JANUARY 1980. OBSERVATION WELL (OW) INSTALLED IN THE COMPLETED BORING, AS NOTED.
NOTES:
1. BASE PLAN PREPARED FROM 40 SCALE PLAN PROVIDED BY CAMP, DRESSER & MCKEE, INC., ENTITLED "COMBINED SEWER OVERFLOW PROJECT, DORCHESTER BAY AREA FACILITIES PLAN" FOR THE METROPOLITAN DISTRICT COMMISSION.
2. LOCATION AND ELEVATION OF BORINGS WERE DETERMINED BY CAMP DRESSER & MCKEE, INC.
3. ALL BORINGS WERE PERFORMED BY GUILD DRILLING CO., INC. DRILLING OPERATIONS WERE MONITORED BY HALEY & ALDRICH PERSONNEL.
4. ELEVATIONS REFER TO MDC DATUM

METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PROPOSED SCREENING / DISINFECTION FACILITY
COMMERCIAL POINT, DORCHESTER, MASS.

SITE AND SUBSURFACE EXPLORATION PLAN

MARCH 1980

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

FIGURE 2

BRUNING 44 141 35,156
H & A No. 4140 82

APPENDIX A

Logs of Test Borings

Prepared by

Guild Drilling Co., Inc.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 2
DATE
HOLE NO. D2-1
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 7'6" overnight after Hours
54' Casing
At after Hours

Rods-"NW"	CASING	SAMPLER	CORE BAR.
Type	NW	S/S	
Size I.D.	3"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	1/3/80	a.m. p.m.
COMPLETE	1/4/80	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	G.Brouillette	
INSPECTOR	J. Hight	
SOILS ENGR.		

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-1'6"	D	4	15	31	Moist dense		4" Topsoil - Dark Brown Sand, Silt & Gravel, trace of cinder & glass FILL	1	18"	16"
	3											
	2	4'-5'6"	D	3	2	1				-	18"	0"
	1							6'				
	3	5'6"-7'	D	1	2	3	Wet/m stiff		Yellow Brown & Gray sandy CLAY	2	18"	9"
	15											
	32							9'				
	15	9'-10'	D	8	5		W/m/d	10'	Yellow silty fine SAND	3	12"	12"
	17	10'-10'6"	D			8	Moist stiff		Yellow silty CLAY, trace of fine sand	3A	6"	6"
	19							12'				
	27											
	28											
	21	14'-15'6"	D	6	5	2	Wet loose		Yellow & Gray fine SAND & Silt	4	18"	6"
	18											
	28							17'				
	27											
	30											
		19'-20'6"	D	4	7	5	Wet stiff		Grayish to Yellow CLAY, trace of silt & very fine sand layers	5	18"	18"
								24'	Gray F-M SAND, some silt,			
	26	24'-25'	D	4	6		W/loose	25'	trace clay & fine gravel	6	12"	12"
	28	25'-25'6"	D			6	Wet/m stiff		Yellow CLAY, trace of	6A	6"	6"
	37							27'	fine sand			
	46											
	51											
		29'-30'6"	D	16	19	16	Wet Hard		Yellow SILT, fine Sand & Clay (layered)	7	18"	4"
								34'				
	67	34'-35'6"	D	10	10	12	Wet very stiff		Yellow SILT & very fine Sand (layered), trace of clay	8	18"	18"
	90											
	77											
	50											
	75							39'				
	65											

GROUND SURFACE TO 59' USED NW "CASING: THEN S/S to 60'6"

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 60'6"
Rock Coring
Samples 13

HOLE NO. D2-1

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R. I.

SHEET 2 OF 2
DATE
HOLE NO. D2-1
LINE & STA.
OFFSET
SURF. ELEV.

TO | ADDRESS
PROJECT NAME | LOCATION
REPORT SENT TO | PROJ. NO.
SAMPLES SENT TO | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At ____ after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I.D.			
Hammer Wt.			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		
BORING FOREMAN		
INSPECTOR		
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
Drilled Ahead	95	39'-40'6"	D	17	19	25	Wet dense		Brown fine to coarse SAND & Gravel, some silt, cobbles	9	18"	6"
	110											
	110											
	213							44'				
	50	44'-45'6"	D	36	65	42	Wet very dense		Brown fine to coarse SAND, Silt, some gravel, trace of clay & cobbles	10	18"	9"
	60											
	75											
	173											
	210											
	51	49'-50'6"	D	25	26	45	"			11	18"	12"
	50											
	52											
	101											
	220											
	50	54'-55'	D	40	125		"			12	12"	2"
	55											
	74											
	79											
	125											
		59'-60'	D	39	80		"	60'		13	12"	12"
		60'-60'6"	D			120	M/v/d	60'6"	Gray weathered ARGILLITE	13A	6"	6"
									Bottom of Boring 60'6"			

GROUND SURFACE TO ____ USED ____ "CASING: THEN ____

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring
Rock Coring
Samples

HOLE NO D2-1

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1
DATE
HOLE NO. D2-2
LINE & STA.
OFFSET
SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.
REPORT SENT TO above / Bay Area | PROJ. NO.
SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS
At 2'6" after 0 Hours
At ____ after ____ Hours

Rods-"NW"	CASING	SAMPLER	CORE BAR.
Type	NW	S/S	
Size I D.	3"	1 3/8"	
Hammer Wt	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	1/4/80	a.m. p.m.
COMPLETE	1/4/80	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	G.Brouillette	
INSPECTOR	J. Hight	
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-1'6"	D	60	25	16	Dry dense	2'	1" Topsoil - Brown Sand, Silt & Gravel - FILL	1	18"	16"
	3											
	5											
	4	4'-5'6"	D	2	2	3	Wet loose		" same with Cinders, trace of glass - FILL	2	18"	12"
	5											
	6							7'6"				
	8											
	9						Wet		Gray fine sandy Org. SILT, trace of shells & fibers			
	12	9'-10'	D	WR	1		soft	10'		3	12"	12"
	14	10'-10'6"	D			1	"		Dark Gray Organic SILT (oil odor noted)	3A	6"	6"
	19											
	14											
	14							14'				
	12	14'-15'6"	D	2	2	2	Wet soft			-	18"	0"
	14											
	14	15'6"-17'	D	2	1	2			Gray Clayey Organic SILT, trace of very fine sand & shells	4	18"	18"
	13											
	14											
		19'-20'6"	D	1	1	2	"			5	18"	12"
								24'6"				
		24'-25'6"	D	1	4	5	Moist stiff		Gray CLAY with fine Sand Layers	6	18"	18"
								29'				
		29'-30'6"	D	3	6	9	Moist/v stiff	30'6"	Yellow Gray CLAY	7	18"	18"
									Bottom of Boring 30'6"			
									Installed Observation Well at 20'			
									WR = Weight of Rods			

GROUND SURFACE TO 24' USED NW "CASING: THEN

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:
Earth Boring 30'6"
Rock Coring
Samples 7

HOLE NO D2-2

TOWN PRESS — EAST PROV.

DORCHESTER -
FOX POINT SCREENING/
DISINFECTION FACILITY

CONSULTING OFFICE ENGINEERS AND GEOLOGISTS

HALEY & ALDRICH, INC.
238 MAIN STREET · CAMBRIDGE · MASSACHUSETTS 02142
617/492-6460

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GARY S. BRIERLEY
RICHARD P. STULGIS

Revised 24 March 1980
File No. 4140

MEMORANDUM

TO: Camp, Dresser & McKee, Inc.
Attn: Mr. Steve Hickox
Mr. Victor Coletti

FROM: Haley & Aldrich, Inc.
Edward B. Kinner
Kenneth L. Recker

SUBJECT: MDC Combined Sewer Overflow Study
Proposed Screening and Disinfection Facility
at Fox Point, Dorchester, Massachusetts

I. INTRODUCTION

The proposed screening and disinfection facility is to be located in McConnell Park, approximately 100 feet east of the Southeast Expressway, and 100 feet northwest of the shoreline of Malibu Beach, in Dorchester, Massachusetts (see Figure 1, Project Locus). The site is approximately level, with an average ground surface at El. 114 (MDC Sewers Datum).

It is understood that the proposed screening and disinfection facility will consist of a single story structure and a section of sewer conduit. The conduit will be incorporated into a below-grade portion of the building where it passes below the structure. The structures have the following design characteristics:

- Screening and disinfection facility plan dimensions: 52 ft. x 34 ft.
- Main floor: El. 116.75
- Finished exterior grade: El.116
- Conduit cross-section dimensions: 8 ft. by 10 ft.
- Conduit invert: El. 98

The proposed conduit will connect to the existing Fox Point conduit. Available information indicates that the existing conduit is pile supported although specific information at this section of the conduit is lacking.

II. SUBSURFACE EXPLORATIONS

One test boring, D1-1, was drilled at the location shown on Figure 2, during the period 26 December 1979 to 3 January 1980, to obtain preliminary subsurface information regarding soil and water conditions. The boring was drilled to a depth of 90.5 ft., terminating in naturally deposited inorganic clay. The boring was 2-1/2 inch diameter standard drive sample boring, with an observation well installed to a depth of 20 feet in the completed boring. The test boring was drilled by Guild Drilling Company, Inc., of East Providence, Rhode Island and monitored by Haley & Aldrich personnel. Boring location and elevation were recorded by CDM personnel. The contractor's boring log is included in Appendix A.

III. SUBSURFACE CONDITIONS

The subsurface exploration reveals the following generalized soil sequence, beginning at ground surface and extending downward:

1. Fill
2. Organic Silt
3. Clay

Fill: A layer of fill consisting of compact brown silty fine sand with little gravel, brick and asphalt was placed over the site. The fill thickness encountered in the boring is 7 ft.

Organic Silt: An approximately 41.5 ft. thick stratum of organic silt underlies the fill. As disclosed by the boring, the stratum consists of very soft to very stiff gray organic silt with shell fragments. A 3-ft. thick layer of silty coarse to fine sand with little gravel and organics is contained within the organic silt deposit at a depth of 13 to 16 ft. A 5.5 ft. thick layer of peat and organic silty fine sand is present below the organic silt.

Clay: A deposit of soft to stiff gray silty clay with fine sand layers underlies the organic soils. The boring was terminated at a depth of 90.5 ft., after penetrating 36.5 ft. into the clay.

Groundwater observation well readings obtained during January, February and March, 1980, indicate that the groundwater level varied from approximately El. 105.8 to El. 106.6. The water level at the site can be expected to vary with precipitation, season, temperature and construction activity in the area. Therefore, levels encountered during construction may not be the same as those recorded for the observation well.

IV. LABORATORY TESTING

The laboratory testing program consisted primarily of performing unconfined compression tests on Shelby tube samples of the organic silt and clay strata. The purpose of the unconfined compression tests was to determine the undrained shear strength to evaluate bottom stability for excavation and construction.

Routine classification tests (Atterberg limits and natural water content) of the tube samples were also performed to assist in classification and for correlation of engineering properties.

All laboratory tests were performed in the Haley & Aldrich soils laboratory. The tests were conducted according to the latest ASTM procedures using modern soil testing equipment. The results of laboratory tests are summarized in Table I. The undrained shear strength s_u (equal to one-half the compressive strength) for the organic silt varied from approximately 280 to 510 lbs. per sq. ft.

V. PRELIMINARY DESIGN RECOMMENDATIONS

Based on information disclosed in boring D1-1, the proposed bottom of the conduit will be underlain by approximately 36 ft. of organic silt. The one-story structure will be underlain by fill and organic soils.

The organic silt and fill soils are unsuitable for support of any foundation units. Structural units founded on these soils can be expected to experience relatively substantial post-construction movements resulting from compression of the organic soils. Foundation units for the proposed structures must be supported on or within the naturally deposited inorganic soils which lie below the organic silt and fill. The depth below ground surface to suitable inorganic soil is approximately 50 ft. Excavation of unsuitable soils and replacement with compacted structural fill is uneconomical at this depth.

It is, therefore, recommended that the conduit and screening and disinfection facility be supported on medium capacity piles driven into the clay stratum and designed to support the structural load in friction along the pile perimeter. The lowest level slabs should be designed as structural slabs spanning between pile support points.

It is recommended that the piles be 14-in. square precast-prestressed concrete piles having a maximum structural load capacity of 50 tons. It is anticipated that piles of this capacity would require an embedment of approximately 43 ft. in naturally deposited inorganic soil. Therefore, pile lengths on the order of 90 to 100 ft. should be assumed.

Design loads to be considered for support of the conduit should be equal to the sum of the weight of the conduit, transported product and overlying soil contained within an area defined by 2 vertical to 1 horizontal lines rising from each side of the top of the conduit, up to final grade.

It is our opinion that the site should be considered a Class B site in accordance with the seismic provisions of the Massachusetts State Building Code. The subsoils at the site are not considered susceptible to liquefaction. If calculation of lateral seismic forces is required for design, a soil factor of S = 1.5 should be used.

Since the conduit will be a buried structure extending below the water table, it will be subjected to hydrostatic uplift forces. We recommend that the conduit be designed to resist the uplift forces that would be calculated based on a recommended maximum design water level of El. 115.0. The overlying soil contained within the envelope defined previously for support considerations may be relied upon to resist uplift forces. In addition, if required, the piles could be relied upon to provide uplift resistance by designing a tension connection at the pile cap.

It is anticipated that the relocated 42-in. storm drain could be earth-supported on a minimum 36-in. thickness of compacted structural fill.

It is understood that the final site grade will be at approximately El. 116.0 and thus there will be little or no change in site grades. Consequently, no significant post-construction settlements of the finished grade are expected.

VI. CONSTRUCTION CONSIDERATIONS

6-01. General

The primary purpose of this section of the report is to comment on items related to excavation, dewatering, lateral support, earthwork and related geotechnical aspects of the proposed construction. It is written primarily for the engineer having responsibility for preparation of preliminary design and cost estimates.

6-02. Conduit

Based on the maximum depth of the required excavation (approximately 20 ft. to El. 96) and the undrained shear strength of the organic soils, it is our opinion that an open cut excavation would require very flat excavated slopes (slopes flatter than 5 horizontal to 1 vertical) or benched excavation in the side slopes that would require no more than 12 ft. of excavation to final grade. It is our opinion that due to the presence of the coarse to fine sand layer at a depth of 13 to 16 ft., wellpoints or deep well sumps would be required to predrain the site.

Alternatively, a laterally supported sheeted excavation could be used. It is expected that interlocking steel sheeting driven below the proposed bottom of excavation would provide the required lateral support. For preliminary cost estimates, it may be assumed that 40-ft. long sheet piles are required for stability and seepage cut-off. Internal bracing would be required to support the sheeting. It is our opinion that the excavation could then proceed with seepage control provided by sumps and open pumping. Final excavation and all foundation construction should be conducted in the dry. Since the structures will be supported on piles, it will be possible to extract the sheet piling near the completion of construction without inducing structure settlement.

6-03. Screening and Disinfection Facility

It is anticipated that foundation construction for the proposed screening and disinfection facility, with the exception of the below-grade portion of the conduit, can be accomplished with open excavation and nominal dewatering.

VII. CLOSURE

The evaluations and recommendations presented herein are based on a preliminary subsurface exploration and proposed construction and are not considered sufficient for final design. It is recommended that additional subsurface investigations be undertaken during final design to determine the depth to suitable foundation soils for purposes of estimating pile lengths and the nature and depth of fill and organic soils as regards dewatering characteristics.

If differing conditions are encountered during final design or construction, the recommendations included in this memorandum should be reviewed to confirm continued applicability.

HALEY & ALDRICH, INC.

HAA FORM 6 – FEB. 74

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO 4140

SHEET 1 OF 2

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ. FT.	C_c	
D1-1/T1	Gray ORGANIC SILT with fine sand partings	10 - 12					(68.9)					
		10.4		43.5								TV = 0.16 PP = 0.3 SV = 0.18 R = 0.03
		10.6	UC23	42.9			109.3	560	12.8			
		11.2		41.2								TV = 0.19 PP = 0.4 SV = 0.18 R = 0.02
		11.4	LL2	49.0	60.0	27.6						
		11.7	UC24	52.3			102.4	690	12.8			

TABLE I

NOAA FORM 6 – FEB. 74

HALEY & ALDRICH, INC.

SUMMARY OF LABORATORY SOIL TEST RESULTS

MDC Combined Sewer Outflow Study

South Boston, Massachusetts

FILE NO 4140

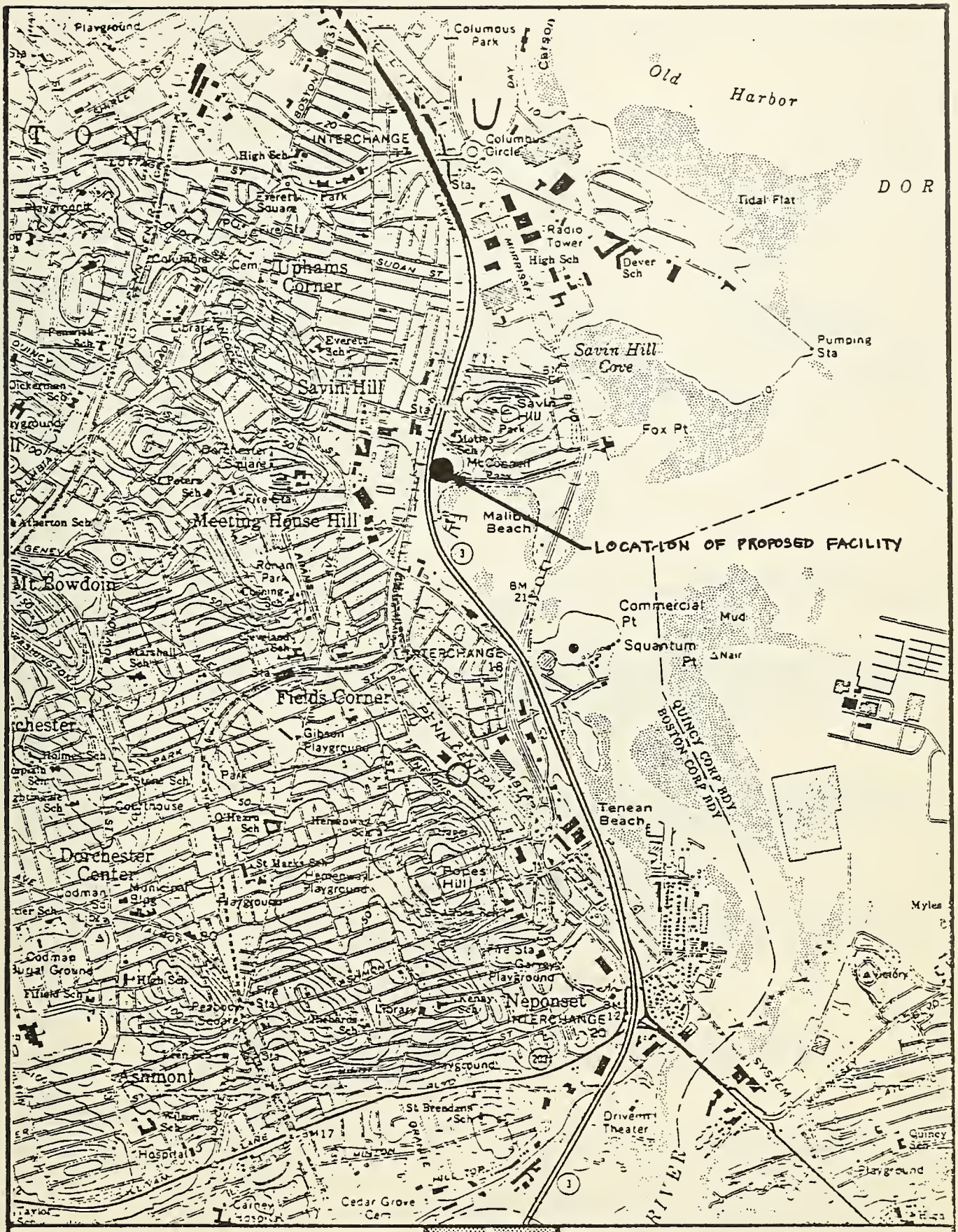
SHEET 2 OF 2

BORING & SAMPLE NUMBER	DESCRIPTION	DEPTH (FEET)	TEST NO.	NATURAL WATER CONTENT %	ATTERBERG LIMITS %		UNIT WEIGHT LB/CU.FT.	UNCONFINED TEST		CONSOLIDATION		OTHER TESTS
					LL	PL		COMPRESSIVE STRENGTH PSF	STRAIN %	MAX. PAST PRESSURE TON/SQ. FT.	C_c	
D1-1/T2	Gray ORGANIC SILT, few shells	40 - 42					(97.7)					
		41.0		69.7								TV = 0.08 PP = 0 SV = 0.15 R = 0.02
		41.2	UC25	65.3			97.9	1030	11.2			
		41.8	L13	67.5	82.0	38.8						TV = 0.32 PP = 0.5 SV = 0.32 R = 0.03
D1-1/T3	Gray silty CLAY, some fine sand partings	59 - 61					(119.8)					
		59.4		38.4								TV = 0.32 PP = 0.5 SV = 0.34 R = 0.04
		59.7	UC26	35.9			114.2	1380	13.2			
		60.2	L14	32.2	38.0	19.1						TV = 0.45 PP = 0.75 SV = 0.4 R = 0.06
		60.5	UC27	37.0			114.4	1330	13.2			
		60.8		36.9								TV = 0.52 PP = 1.0 SV = 0.52 R = 0.08

NOTES:

TV = Shear strength in TSF as measured by Torvane, manufactured by Soiltest.
SV = Shear strength in TSF as measured by LabVane, manufactured by Geonor.
R = Remolded shear strength in TSF as measured by LabVane, manufactured by Geonor.
PP = Compressive strength in TSF as measured by Pocket Penetrometer, manufactured by Soiltest.
( ) = Unit weight of entire tube sample.
T = 2-inch diameter Shelby tube.
U = 3-inch diameter tube by stationary piston method.

TABLE I



HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

PROJECT LOCUS

U.S.G.S. QUADRANGLE
BOSTON SOUTH, MA
APPROX. SCALE: 1"= 2000'

FILE NO. 4140 A1

FIGURE 1

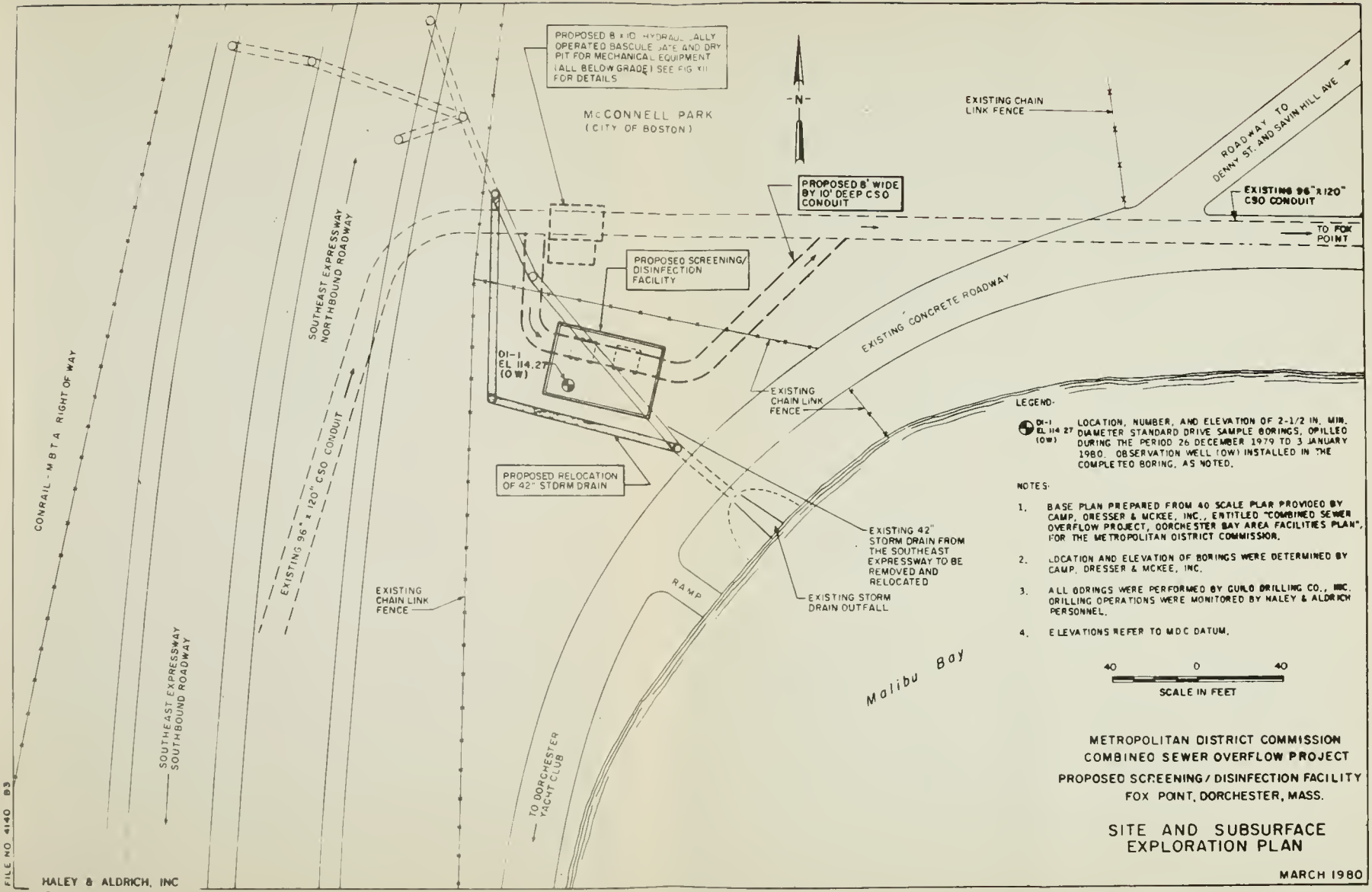

PROPOSED 8' x 10' HYDRAULICALLY OPERATED BASCULE GATE AND DRY PIT FOR MECHANICAL EQUIPMENT (ALL BELOW GRADE) SEE FIG XII FOR DETAILS
McCONNELL PARK (CITY OF BOSTON)
N
EXISTING CHAIN LINK FENCE
ROADWAY TO DENNY ST. AND SAVIN HILL AVE
EXISTING 96"x120" CSO CONDUIT
TO FOX POINT
PROPOSED 8' WIDE BY 10' DEEP CSO CONDUIT
PROPOSED SCREENING/ DISINFECTION FACILITY
EXISTING CONCRETE ROADWAY
SOUTHEAST EXPRESSWAY NORTHBOUND ROADWAY
CONRAIL - M B T A RIGHT OF WAY
EXISTING 96" x 120" CSO CONDUIT
01-1 EL 114.27 (OW)
EXISTING CHAIN LINK FENCE
PROPOSED RELOCATION OF 42" STORM DRAIN
EXISTING 42" STORM DRAIN FROM THE SOUTHEAST EXPRESSWAY TO BE REMOVED AND RELOCATED
EXISTING STORM DRAIN OUTFALL
RAMP
EXISTING CHAIN LINK FENCE
SOUTHEAST EXPRESSWAY SOUTHBOUND ROADWAY
TO DORCHESTER YACHT CLUB
Malibu Bay
LEGEND:
01-1 EL 114.27 (OW) LOCATION, NUMBER, AND ELEVATION OF 2-1/2 IN. MIN. DIAMETER STANDARD DRIVE SAMPLE BORINGS, DRILLED DURING THE PERIOD 26 DECEMBER 1979 TO 3 JANUARY 1980. OBSERVATION WELL (OW) INSTALLED IN THE COMPLETED BORING, AS NOTED.
NOTES:
1. BASE PLAN PREPARED FROM 40 SCALE PLAN PROVIDED BY CAMP, DRESSER & MCKEE, INC., ENTITLED "COMBINED SEWER OVERFLOW PROJECT, DORCHESTER BAY AREA FACILITIES PLAN", FOR THE METROPOLITAN DISTRICT COMMISSION.
2. LOCATION AND ELEVATION OF BORINGS WERE DETERMINED BY CAMP, DRESSER & MCKEE, INC.
3. ALL BORINGS WERE PERFORMED BY GURLO DRILLING CO., INC. DRILLING OPERATIONS WERE MONITORED BY HALEY & ALDRICH PERSONNEL.
4. ELEVATIONS REFER TO MDC DATUM.
40 0 40
SCALE IN FEET
METROPOLITAN DISTRICT COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PROPOSED SCREENING / DISINFECTION FACILITY
FOX POINT, DORCHESTER, MASS.
SITE AND SUBSURFACE EXPLORATION PLAN
MARCH 1980
FILE NO 4140 B3
HALEY & ALDRICH, INC
CAMBRIDGE, MASSACHUSETTS

FIGURE 2

APPENDIX A

Logs of Test Borings

Prepared by

Guild Drilling Co., Inc.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I.

SHEET 1 OF 3

DATE

HOLE NO. D1-1

LINE & STA.

OFFSET

SURF. ELEV.

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME MDC-CSO -- Dorchester | LOCATION Boston, Mass.

REPORT SENT TO above / Bay Area | PROJ. NO.

SAMPLES SENT TO " | OUR JOB NO. 80-208

GROUND WATER OBSERVATIONS

At 9' after Hours w/55' Casing

At after Hours

	CASING	SAMPLER	CORE BAR.
Type	NW-BW	S/S	
Size I.D.	3" 2½"	1 3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	

	Date	Time
START	12/26/79	a.m. p.m.
COMPLETE	1/3/80	a.m. p.m.
TOTAL HRS.		

BORING FOREMAN C. Koehler & G. Brouillette

INSPECTOR

SOILS ENGR. G. Jacobsen

LOCATION OF BORING:

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec.
	12	0'-1'6"	D	8	15	22	Dry dense		Brown Sand, Silt, Gravel & Black Top - FILL	1	18"	16"
	32											
	110											
	38							4'6"				
	14	4'-5'6"	D	11	11	13	Moist/m dense		Brown Sand, Organic Silt & Shells, trace of gravel FILL	2	18"	16"
	16							7'				
	9											
	8											
	6	8'-9'6"	D	2	3	1	Wet soft		Gray Clayey Organic SILT, trace of fine sand & shells	3	18"	12"
	6											
	8	10'-12'	ST	P R E S S						ST1	24"	24"
	7											
	8							13'				
	17											
	14	14'-15'6"	D	7	11	9	Wet/m dense		Gray fine to coarse SAND & fine to medium Gravel, some silt	4	18"	12"
	15							16'				
	7											
	8											
	8											
	11											
	18	20'-21'6"	D	1	1	1	Wet soft		Gray Clayey Organic SILT, trace of shells	5	18"	18"
	12											
	12											
	13											
	15											
	22	25'-26'6"	D	1	1	1	"			6	18"	16"
	12											
	11											
	10											
	10											
	9	30'-31'6"	D	1	1	2	"		(trace of fibers)	7	18"	18"
	7											
	7											
	7											
	8											
	9	35'-36'6"	D	1	1	1	"			8	18"	16"
	6											
	7											
	7	38'-40'	ST	P R E S S						-	24"	0"
	7											

GROUND SURFACE TO 54' USED NW "CASING: THEN Open to Bottom

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density
0-10 Loose
10-30 Med. Dense
30-50 Dense
50 + Very Dense

Cohesive Consistency
0-4 Soft
4-8 M/Stiff
8-15 Stiff
15-30 V-Stiff
30 + Hard

SUMMARY:
Earth Boring 90'6"
Rock Coring
Samples 18

HOLE NO D1-1

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 2 OF 3

TO _____ ADDRESS _____

PROJECT NAME _____ LOCATION _____

REPORT SENT TO _____ PROJ. NO. _____

SAMPLES SENT TO _____ OUR JOB NO. 80-208

DATE _____

HOLE NO. D1-1

LINE & STA. _____

OFFSET _____

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR.
Type			
Size I D.			
Hammer Wt.			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN _____

INSPECTOR _____

SOILS ENGR. _____

LOCATION OF BORING: _____

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No.	Pen	Rec.
	9	40'-42'	ST	P R	E S S					ST2	24"	23"
	9											
	9	42'-43'6"	D	2	2	2	Wet soft		Gray Clayey Organic SILT, trace of shells	9	18"	17"
	12											
	13											
	15											
	14											
	14											
	16						Wet/m	48'6"				
	32	49'-50'	D	2	3		stiff	50'	Br. silty fibrous PEAT	10A	12"	12"
	27	50'-50'6"	D			10	Moist loose		Brown silty fine SAND, trace of coarse sand & fine gravel (organic)	10B	6"	2"
	29											
	25											
	21							54'				
	29											
		55'-56'6"	D	1	3	3	Wet medium stiff		Gray CLAY with some very fine sand layers (plastic in texture)	11	18"	18"
		59'-61'	ST	P R	E S S					ST3	24"	24"
								61'6"				
		61'-62'6"	D	WR	2	1	Wet soft		Gray very fine sandy CLAY, trace fine to med. gravel	12	18"	18"
								64'				
		64'-65'6"	D	WR	1	3	"		Gray CLAY, little very fine sand layers	13	18"	18"
							Wet					
		69'-70'6"	D	1	2	3	medium stiff			14	18"	18"
		74'-75'6"	D	WR	2	3	"		" & fine Sand Layers	15	18"	18"
								80'				

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO D1-1

TOWN PRESS – EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 3 OF 3

TO _____ | ADDRESS _____

PROJECT NAME _____ | LOCATION _____

REPORT SENT TO _____ | PROJ. NO. _____

SAMPLES SENT TO _____ | OUR JOB NO. 80-208

DATE _____

HOLE NO. D1-1

LINE & STA. _____

OFFSET _____

SURF. ELEV. _____

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR
Type			
Size I D.			
Hammer Wt.			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN _____

INSPECTOR _____

SOILS ENGR. _____

LOCATION OF BORING: _____

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		79'-80'6"	D	WR	2	7	Wet stiff		Gray CLAY, little very fine sand layers	16	18"	18"
		84'-85'6"	D	1	5	6	"			17	18"	18"
		89'-90'6"	D	4	5	6	"	90'6"		18	18"	18"
									Bottom of Boring 90'6"			
									Observation Well at 20'			
									WR = Weight of Rods			
									Note: C. Koehler did boring to 55' - G. Brouillette continued boring to 90'6"			

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO D1-1

TOWN PRESS - EAST PROV.

DORCHESTER -
PINE NECK CREEK
STORM DRAIN RELOCATION

CONSULTING GEOTECHNICAL ENGINEERS AND GEOLOGISTS

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Revised 24 March 1980
File No. 4140

MEMORANDUM

TO: Camp, Dresser & McKee, Inc.
Attn: Mr. Steve Hickox
Mr. Victor Coletti

FROM: Haley & Aldrich, Inc.
Edward B. Kinner
Kenneth L. Recker

SUBJECT: MDC Combined Sewer Overflow Study
Pine Neck Creek Storm Drain Relocation
Dorchester, Massachusetts

I. INTRODUCTION

The proposed Pine Neck Creek Storm Drain Relocation is located approximately 1000 ft. northeast of the Neponset Interchange on Route 3 in Dorchester, Massachusetts, as shown on Figure 1, Project Locus. It is understood that the proposed conduit will be approximately 1370 ft. in length and will consist of 78 in. I.D. reinforced concrete culvert pipe.

The proposed alignment begins near the existing Pine Neck Creek outfall headwall (Sta. 0+00) and extends approximately 250 ft. southeast along Tenean Street to Water Street (Sta. 2+50). The alignment continues approximately due east along Water Street for 710 ft. to Taylor Street, (Sta. 9+60), from there continuing southeast for approximately 410 ft. across private property (Shaffer Paper Fibres, Inc.) to a tide gate chamber (Sta. 13+70) at the Neponset River. Existing ground surface varies from approximately El. 115 (MDC Sewers Datum) near the existing outfall, Sta. 0+00, to El. 126 near the

intersection of Port Norfolk Street and Water Street, Sta. 4+50, to El. 110 near the proposed tide gate, Sta. 13+00. The invert elevation varies from approximately El. 101 at Sta. 0+00 to El. 99 at Sta. 13+70.

II. READILY AVAILABLE SUBSURFACE INFORMATION

Due to project deadlines no time was available to perform subsurface explorations along the proposed alignment. Therefore, in accordance with your request, our studies are based on readily available information on subsurface soil and groundwater conditions, which we compiled from H&A files, published data on Boston area geology (BSCE Boring Data) and data from the MDC Archives and the Boston Water and Sewer Commission.

Our search for readily available information indicated that there were several borings reported in the Journal of the Boston Society of Civil Engineers near the existing outfall but no information was available for the other portions of the proposed alignment. Subsequently, you provided information obtained from maps contained in the library of the Boston Athenaeum, dated 1831 (Baker) and 1850 (Whiting). You interpreted that the maps indicated the following ground surface conditions along the proposed alignment:

Sta.	Ground Surface Condition 1831 Map	1850 Map
0+00 to 2+50	MARSH	MARSH
2+50 to 11+60	WOODS	ORIGINAL GROUND
11+60 to 13+70	MARSH	MARSH

III. ASSUMED SUBSURFACE CONDITIONS

Based on the information referenced above, the following generalized soil sequence is assumed, beginning at ground surface and extending downward.

Proposed Alignment

Sta. 0+00 to 2+50	Sta. 2+50 to 11+60	Sta. 11+60 to 13+70
1. Fill	1. Fill	1. Fill
2. Organic Soil	2. Granular Soil	2. Organic Soil
3. Granular Soil		3. Granular Soil

Our comments on the assumed soil sequence for each section follow:

Sta. 0+00 to 2+50 and Sta. 11+60 to 13+70: It is assumed that the thickness of fill is greater than 10 ft. and that the organic soil extends approximately 10 ft. below the invert of the conduit. The classification as granular soil is intended to refer to a soil deposit, consisting principally of naturally deposited inorganic sand or sand and gravel which contains varying amounts of silt and is predominantly cohesionless in-situ. The granular soils should be expected to contain lenses and layers of clay soils.

Sta. 2+50 to 11+60: It is assumed that the fill thickness is greater than 10 ft. and that the top of the naturally deposited inorganic granular soils is above the invert level of the conduit.

It is anticipated that water levels along the alignment near the Neponset River will be influenced by tidal fluctuations. The maximum groundwater level may be as high as El. 110. Extreme high tides near the river may be as high as El. 115. In addition, water levels can be expected to vary as a result of seasonal or annual fluctuations, climatic conditions and construction activity in the area.

IV. PRELIMINARY DESIGN RECOMMENDATIONS

A. Support

The fill and organic soils are unsuitable for support of the conduit. Conduits founded on these soils can be expected to experience relatively substantial post-construction settlement resulting from consolidation of the organic soil. The proposed conduit must be supported in naturally deposited inorganic soil underlying the fill and organic soils.

Based on our preliminary analysis and the assumed subsurface conditions, it is recommended that the conduit be supported on low capacity timber piles where the thickness of organic soils below the conduit is greater than 5 ft. Based on the assumed subsurface conditions, the conduit will require pile support from Sta. 0+00 to 2+50 and Sta. 11+60 to 13+70. The timber piles should be Type I species as described in the Massachusetts State Building Code with a design capacity of 20 tons. It is recommended that the piles have a minimum tip diameter of 8 in. It is anticipated that piles will derive their capacity in friction along the pile perimeter or in end bearing in suitable inorganic soils. For preliminary cost estimates it may be assumed that pile lengths on the order of 40 ft. below the pipe are required for support.

Alternately, if desired, higher capacity piles such as pre-cast-prestressed concrete or cast-in-place concrete piles would be used. Capacities on the order of 50 tons would be attainable for commonly sized piles. It is anticipated that piles will derive their capacity in friction along the pile perimeter or in end bearing in suitable inorganic soils. Anticipated pile lengths cannot be estimated with confidence based on available subsurface data. For preliminary cost estimates it may be assumed that pile lengths on the order of 55 ft. below the conduit are required.

It is recommended that the conduit be earth supported where naturally deposited inorganic soils are encountered below the invert of the conduit or on compacted structural fill placed after removal of unsuitable soils (fill and organic soils) where the depth to naturally deposited inorganic soils below the conduit is less than 5 ft. Based on the assumed subsurface conditions, the conduit may be earth supported from Sta. 2+50 to 11+60.

Design loads to be considered for support of the conduit should be equal to the sum of the weight of the conduit, transported product and overlying soil contained within an area defined by 2 vertical to 1 horizontal lines rising from the springline of the conduit to final grade.

B. Bedding

It is understood that the conduit will have a concrete cradle for bedding for the entire length. If gravel or stone bedding material is used, it is recommended that a minimum 6-in. layer of concrete sand be placed between the subgrade and the gravel or stone bedding material, if the subgrade consists of fine grained soil.

C. Trench Backfill

In order not to disturb the bedding, for soil supported pipe sections, all timber and steel sheeting, if used, should be cut off at or above the mid-diameter of the pipe prior to pulling. Timber sheeting above mid diameter of the pipe should be removed, but steel sheeting may be left in place. It is understood that if steel sheeting is left in place within paved areas, it will be be cut off 8 ft. below finished grade. For pile supported portions of the conduit, it will be possible to extract the sheet piling near the completion of construction without inducing structure settlements.

It is recommended that backfill placed above the bedding to a height of 12 in. above the top of pipe consist of compacted structural fill and backfill placed one foot above the top of pipe to finished grade consist of common fill. In order to minimize post-construction settlement of the backfill below paved areas or major streets, it is recommended that compacted structural fill be used to backfill the final 36 in. of the trench in place of common fill.

Common fill should consist of any inorganic predominatly granular mineral soil free from loam, wood, trash and other objectionable materials. Common fill should be placed in layers not exceeding 10 inches in thickness and compacted to 92 percent maximum dry density.

Compacted structural fill should consist of gravel, sandy gravel or gravelly sand free of organic material, loam, trash, snow, ice, frozen soil and other objectionable material and should be well graded within the following limits:

Sieve Size	Percent Finer By Weight
6 - inch	100
No. 4	30 - 95
No. 40	5 - 50
No. 200	0 - 8

Compacted structural fill should be placed in layers not exceeding 8 inches in thickness and compacted to 92 percent maximum dry density.

V. CONSTRUCTION CONSIDERATIONS

5-01. General

The primary purpose of this section is to comment on items related to excavation, dewatering, lateral support, earthwork and related geotechnical aspects of proposed construction. It is written primarily for the engineer having responsibility for preparation of preliminary design and cost estimates.

5-02. Excavation and Dewatering

Excavations varying from approximately 12 to 28 ft. deep will be necessary for construction of the proposed conduit. Since the majority of the alignment is located within city streets, it is recommended that a laterally supported sheeted excavation be used. Anticipated lengths and type of sheeting cannot be estimated with confidence based on available subsurface data. For preliminary cost estimates it may be assumed that interlocking steel sheeting will be required and that sheeting lengths based on a minimum penetration of 10 ft. below excavation level are required for stability and seepage cut-off. Internal bracing will be required to support the sheeting.

It is our opinion that the excavation could then proceed with seepage control provided by sumps. Final excavation and all foundation construction should be conducted in-the-dry.

It is anticipated that a braced steel sheet pile cofferdam will be required to construct the proposed tide gate chamber at the Neponset River. Sheeting lengths cannot be estimated based on available subsurface data. For preliminary cost estimates it may be assumed that 35 ft. long sheet piles will be required for stability and seepage cut-off.

VI. CLOSURE

The evaluations and recommendations presented herein are based upon readily available subsurface information and the proposed construction. Due to the unknowns resulting from the lack of site-specific subsurface information, these recommendations are intended for preliminary design only.

Unknown factors apparent at this time include site-specific subsurface conditions, the depths to suitable bearing materials and anticipated pile tip elevations, engineering properties of the subsurface soils and the nature of fill materials as regards obstructions and dewatering characteristics.

It is recommended that subsurface explorations be undertaken during final design to determine these unknown factors. Should differing conditions become evident during final design exploration or construction, these recommendations should be reviewed to confirm continued applicability.

PROJECT LOCUS

U.S.G.S. QUADRANGLE

BOSTON SOUTH, MA

APPROX. SCALE: 1"= 2000'

HALEY & ALDRICH, INC.

CAMBRIDGE, MASSACHUSETTS

N

FILE NO. 4140 A1

FIGURE 1

APPENDIX D

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